National Capital Region of the National Park Service
US Department of the Interior

National Capital Region

Long Range Transportation Plan

Final — December 2018

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Final — July 2018

Cover Photos (clockwise from top left): Arlington Memorial Bridge; Washington Monument; Chesapeake and Ohio Canal Towpath; Lyndon B Johnson Memorial Grove; Rock Creek and Potomac Parkway

Back Cover Photo: Park ranger interacting with visitors on the Chesapeake and Ohio Canal Towpath

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This first *National Capital Region Long Range Transportation Plan* was prepared as a collaborative effort between the Washington Support Office Facilities Planning Branch, National Capital Regional Office, Denver Service Center, and the Federal Highway Administration's Eastern Federal Lands Highway Divisions and John A Volpe National Transportation Systems Center.

Following a 30-day stakeholder review period, the final version of the *National Capital Region Long Range Transportation Plan* is hereby accepted by the National Capital Regional Director as of the date shown below.

Robert A. Vogel 6-22-18

ACCEPTED Date

Robert A. Vogel, Regional Director, National Capital Region

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Table of Contents

Executive Summary x
Background x
Purpose of the Plan. xi
National Capital Region LRTP Vision xii
Summary of Findings xiii
Chapter 1. Planning Framework 1
Transportation in the National Capital Region 2
Transportation Assets. 3
The Project Process 3
Goals and Objectives 5
Strategies 8
Measuring System Performance 12
Alignment with Planning Requirements and Existing Plans 12
Putting the Plan Into Action 13
Chapter 2. National Capital Region Investment Strategy. 15
Investment Strategy Principles 16
NCR Transportation Investment Strategy 17
Six-Year Expected Outcomes 18
Strategy Development 19
Implementation 20
Chapter 3. Asset Management. 23
Introduction 24
Baseline Conditions and Trends. 26
Regional Issues and Opportunities 37
Measuring System Performance 39
Chapter 4. Transportation Finance. 43
Introduction 44
Baseline Conditions and Trends. 45
Regional Issues and Opportunities 56
Measuring System Performance 57
Chapter 5. Resource Protection 59
Introduction 60
Baseline Conditions and Trends. 61
Regional Issues and Opportunities 73
Measuring System Performance 75

Chapter 6. Visitor Experience 79
Introduction 80
Baseline Conditions and Trends 81
Regional Issues and Opportunities 91
Measuring System Performance 102
Chapter 7. Safety and Security 105
Introduction 106
Baseline Conditions and Trends 107
Regional Issues and Opportunities 116
Measuring System Performance 118
Conclusion 121
Acknowledgments 124
References 127
Appendices 131
Appendix A: Summary of Goals, Objectives, and Performance Measures 132
Appendix B: NCR Park Unit List 141
Appendix C: National Capital Region Long Range Transportation Plan Superintendents' Survey Report 144
Appendix D: National Capital Region Asset Types 155
Appendix E: Summary of Congestion in the National Capital Region 159

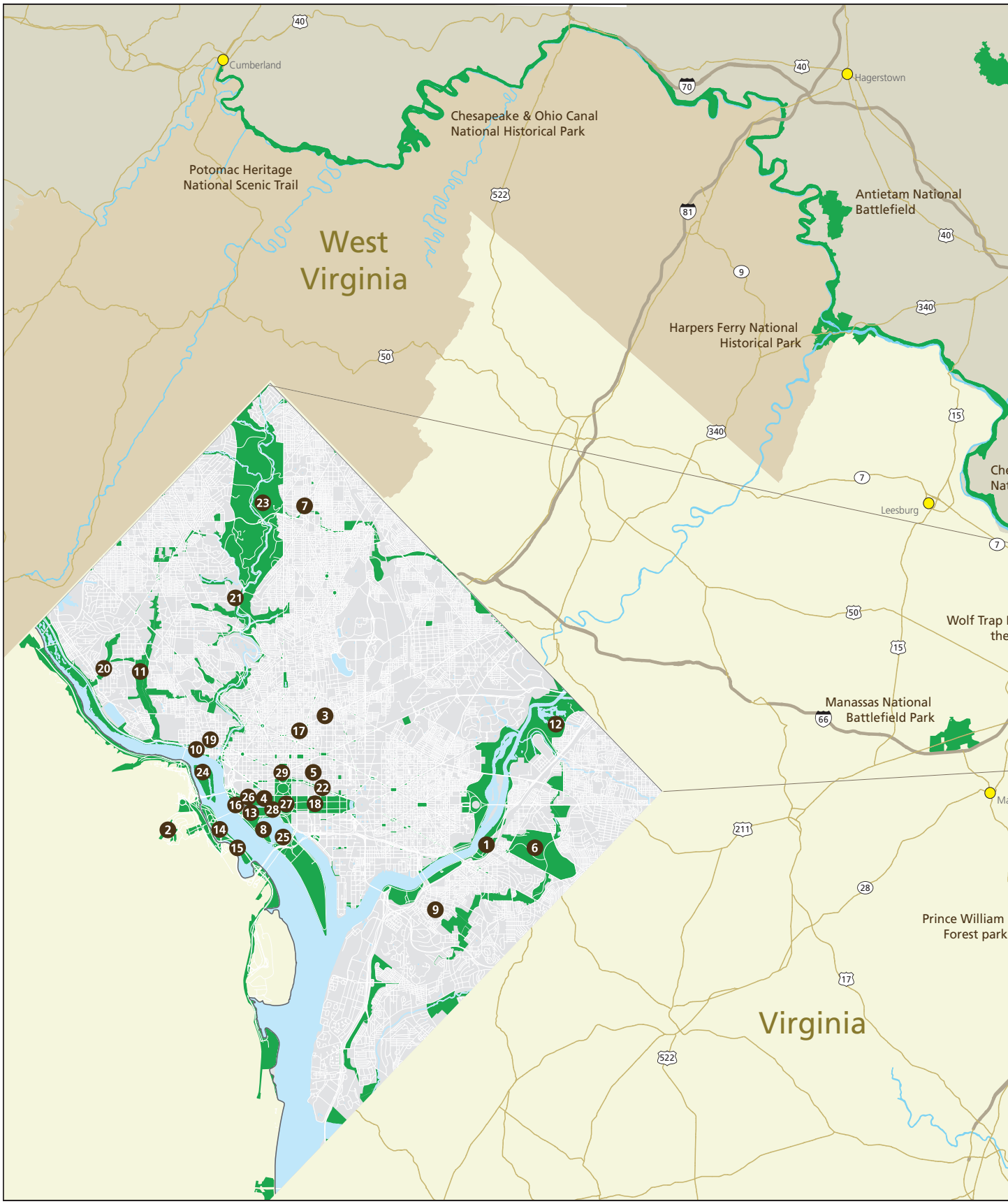
George Washington Memorial Parkway

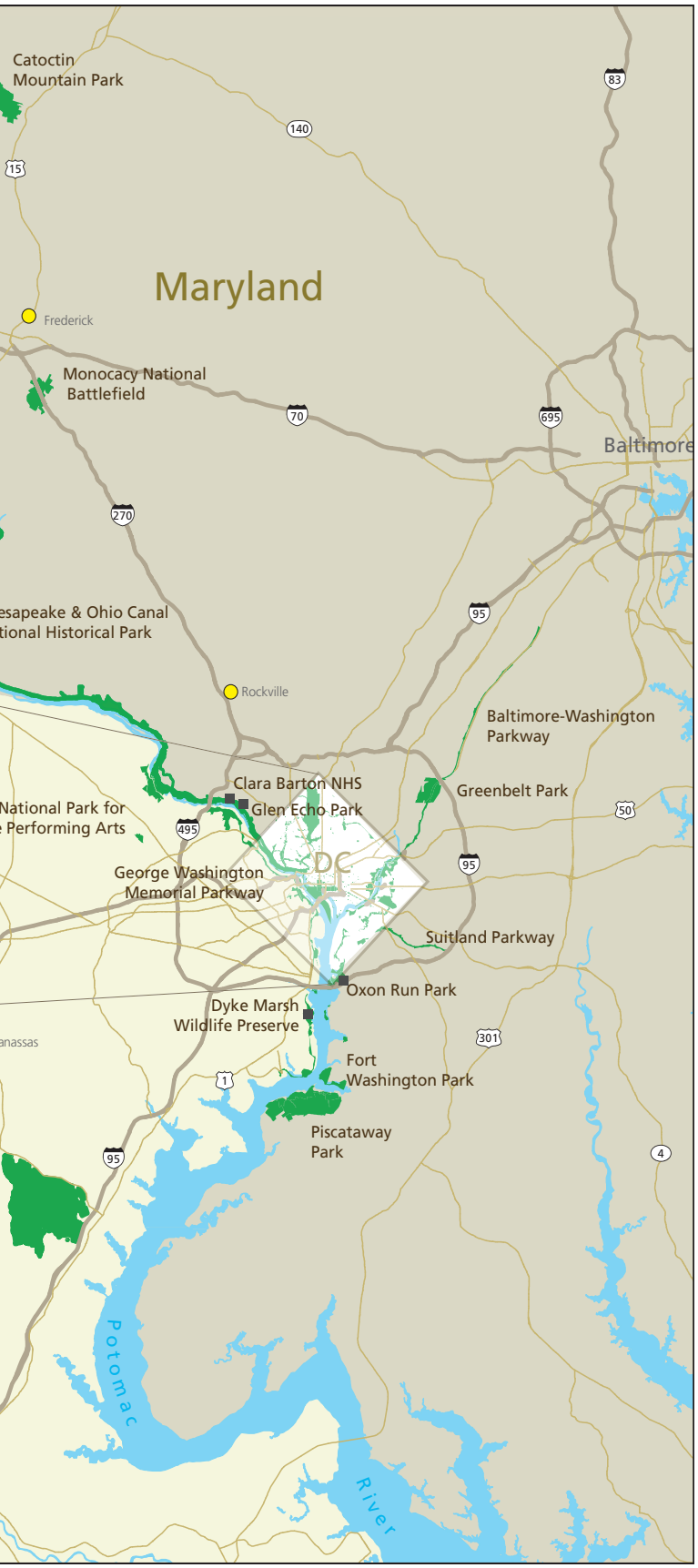
Acronyms

ATS	Alternative Transportation Systems
ABA	Architectural Barriers Act
API	Asset Priority Index
BAWA	Baltimore-Washington Parkway
BHI	Bridge Health Index
BIP	Bridge Inspection Program
CIS	Capital Investment Strategy
CO	Carbon Monoxide
CHOH	Chesapeake and Ohio Canal National Historic Park
CCRP	Climate Change Response Program
CFP	Climate Friendly Parks
CR	Component Renewal
CSAP	Comprehensive Survey of the American Public
CMS	Congestion Management System
CMAQ	Congestion Mitigation and Air Quality
CV/AV	Connected and Autonomous Vehicles
CLRP	Constrained Long Range Transportation Plan
CHART	Coordinated Highways Action Response Team
CMF	Crash Modification Factor
CRV	Current Replacement Value
DM	Deferred Maintenance
DSC	Denver Service Center
DOE	Department of Energy
DOI	Department of the Interior
DOT	Department of Transportation
DDOT	District of Columbia Department of Transportation
EFLHD	Eastern Federal Lands Highway Division, FHWA
FCI	Facility Condition Index
FO	Facility Operations
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FLMA	Federal Land Management Agency
FLAP	Federal Lands Access Program
FLTP	Federal Lands Transportation Program
FMSS	Facility Management Software System
FRP	Federal Real Property
FTA	Federal Transit Administration
FBMS	Financial and Business Management System
FY	Fiscal Year
FAST Act	Fixing America's Surface Transportation Act
FC	Functional Classification
GSA	General Service Administration
GWMP	George Washington Memorial Parkway
GHG	Greenhouse Gas
GHGFY	Greenhouse Gas Fiscal Year
HEPMPO	Hagerstown Eastern Panhandle Metropolitan Planning Organization
HPMA	Highway Pavement Management Application
IMARS	Incident Management and Reporting System
IDIQ	Indefinite Delivery/Indefinite Quantity
INSTEP	Innovative Sustainable Transportation Evaluation Process
ITS	Intelligent Transportation Systems
IPCC	International Panel on Climate Change
LRTP	Long Range Transportation Plan
MDOT	Maryland Department of Transportation
MSHA	Maryland State Highway Administration
MTCO2E	Metric Ton of Carbon Dioxide Equivalent
MPO	Metropolitan Planning Organization
MWCOG	Metropolitan Washington Council of Governments
MAP-21	Moving Ahead for Progress in the 21st Century Act
NAAQS	National Ambient Air Quality Standards
NACE	National Capital Parks – East

NCR	National Capital Region
NFHL	National Flood Hazard Layer
NHL	National Historic Landmark
NAMA	National Mall and Memorial Parks
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRL	National Register Listed
OMB	Office of Management and Budget
O&M	Operations and Maintenance
OB	Optimizer Band
OECD	Organization for Economic Cooperation and Development
PFMD	Park Facility Management Division
TRIP	Paul S. Sarbanes Transit in Parks Program
PCR	Pavement Condition Rating
PM	Preventive Maintenance
RM	Recurring Maintenance
RIP	Road Inventory Program
ROCR	Rock Creek Park
SOCC	Sustainable Operations and Climate Change
TCFO	Total Cost of Facility Ownership
TNC	Transportation Network Company
TPB	Transportation Planning Board
USACE	United States Army Corps of Engineers
EPA	United States Environmental Protection Agency
USPP	United States Park Police
VHT	Vehicle Hours Traveled
VMT	Vehicle Miles Traveled
VDOT	Virginia Department of Transportation
V/C	Volume/Capacity
WASO	Washington Support Office

Map of NPS National Capital Region Park Units





Number	Park Unit
1	Anacostia Park
2	Arlington House, The Robert E. Lee Memorial
3	Carter G. Woodson Home National Historic Site (NHS)
4	Constitution Gardens
5	Ford's Theatre NHS
6	Fort Dupont
7	Fort Stevens
8	Franklin Delano Roosevelt Memorial
9	Frederick Douglass NHS
10	Georgetown Waterfront Park
11	Glover-Archbold Park
12	Kenilworth Park and Aquatic Gardens
13	Korean War Veterans Memorial
14	Lady Bird Johnson Park
15	Lyndon Baines Johnson Memorial Grove on the Potomac
16	Lincoln Memorial
17	Mary McLeod Bethune Council House NHS
18	National Mall
19	Old Stone House
20	Palisades Park
21	Peirce Mill
22	Pennsylvania Avenue NHS
23	Rock Creek Park
24	Theodore Roosevelt Island
25	Thomas Jefferson Memorial
26	Vietnam Veterans Memorial
27	Washington Monument
28	World War II Memorial
29	The White House

Executive Summary

The National Capital Region of the National Park Service is pleased to present the first National Capital Region Long Range Transportation Plan.

Background

The National Park Service's (NPS) National Capital Region has 14 administrative park units in the District of Columbia, Maryland, Virginia, and West Virginia. In support of the dual NPS mission of resource protection and visitor experience, the National Capital Region maintains a diverse inventory of transportation assets that facilitate the movement of visitors, staff, and equipment around its park units. The National Capital Region is unique in that many NPS transportation assets serve as critical links in the Washington Metropolitan region's transportation network.

The National Capital Region recognizes that transportation systems are the backbone on which all visitor experiences rely, whether visiting the parks to enjoy natural and cultural resources or traveling through on a commute. Roads, bridges, trails, transit systems, watercraft, and the variety of other transportation modes and services the National Park Service provides are a crucial part of visitor satisfaction. The NPS and regional transportation systems form an interconnected network. Automobiles remain an important means of access; however, other modes of transportation are both important to addressing contemporary challenges and, increasingly, demand by travelers and park visitors alike. Multimodal access and safety, in addition to sustainability, are critical to this plan and the region's future. The long-term sustainability of the National Capital Region's transportation system faces a serious financial challenge. Under the current funding forecast, the National Capital Region will not be able to fulfill the capital, operations, or maintenance needs that support the agency's mission and goals.

Harpers Ferry National Historic Park

Purpose of the Plan

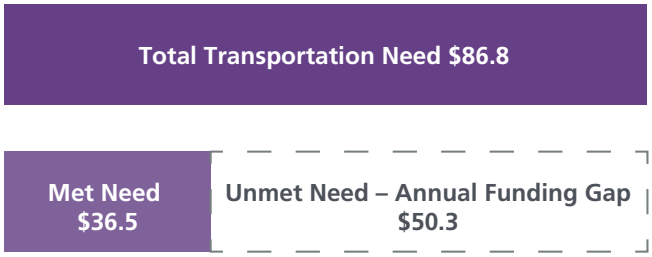
The National Capital Region (NCR) Long Range Transportation Plan (LRTP) sets forth a performance-based, 20-year vision for providing access to the nation's most special and iconic places. It establishes goals, objectives, and performance measures for how NPS will move toward that vision. It provides a strategy for using constrained transportation funding to ensure the most important transportation assets remain in good condition to support the National Park Service's highest-priority mission objectives in resource stewardship, visitor enjoyment, and safety.

Through three workshops and comprehensive technical work, the LRTP was developed with the participation of multidisciplinary subject matter experts from the National Capital Regional Office, park units, and other agency planning and transportation programs. Additional technical assistance was provided by representatives of the Federal Lands Highway Division offices of the US Department of Transportation (DOT), Federal Highway Administration (FHWA), the US DOT John A. Volpe National Transportation Systems Center and other contractors of the NPS Denver Service Center (DSC), and Washington Support Office (WASO) Park Facility Management Division Facilities Planning Branch. The NCR LRTP identifies region-specific goals, objectives, and programmatic strategies and a regional investment strategy to guide transportation decision makers at multiple levels within the agency.

The development of an LRTP is a federal requirement tied to transportation funding (23 USC Section 204). At the time this plan was drafted, the most recent federal transportation funding was Fixing America's Surface Transportation Act (FAST Act, December 2015). The FAST Act increased surface transportation funding for the National Park Service compared to previous years. Nevertheless, the National Capital Region faces an annual funding gap of approximately $50 million when assessing future needs compared to forecast funding. The gap will result in a decline of overall NCR asset condition over time and severely limits opportunities for asset enhancement or expansion. The FAST Act also places more emphasis on tying funding to asset condition, congestion relief, and safety than previous federal legislation. Performance measures and targets are intended to demonstrate progress toward meeting strategic vision and goals.

Figure 1. Annual Estimated NCR Transportation Funding Gap

Note: Figures are in millions of dollars (2015). Parkway reconstruction is included, but Arlington Memorial Bridge rehabilitation is not.



National Capital Region LRTP Vision

The National Park Service's National Capital Region transportation system is a mission focused, financially sustainable, and interconnected transportation system that ensures equitable and safe access to iconic visitor experiences while protecting park resources across the region and in the nation's capital.

The following goal statements further define the vision and organizational framework for the NCR LRTP.

Asset Management

Strategically manage, preserve, and maintain a right-sized and mission-focused portfolio of National Capital Region (NCR) transportation assets through an appropriate level of funding while sustaining long-term access to all transportation services.

Visitor Experience

Provide sustainable and context-sensitive multimodal transportation systems that support the visitor experience through universally accessible and seamless connections between parks, and to and from surrounding communities.

Transportation Finance

Sustainably manage an appropriate level of funding to accomplish the goals of the LRTP and pursue other opportunities to expand funding.

Safety and Security

Enhance the safety of transportation system users and provide a transportation system that is resilient to human-made hazards.

Resource Protection

Incorporate the ideal of leaving park resources unimpaired into all aspects of transportation, including planning, design, construction, maintenance, and disposition.

These goal statements are supported by a series of objectives and strategies presented in Chapter 1: Planning Framework and Findings. The objectives add an additional layer of regional specificity to the more general roles and provide the framework for identifying the specific implementation-level LRTP strategies. The strategies are the actionable and measurable means by which the region will work toward its goals and objectives and implement the LRTP.

Summary of Findings

The National Capital Region engaged parks, federal and state partners, and other stakeholders using a series of multiday workshops to help develop the plan. Through these workshops, critical input was gained and consensus was built regarding the issues and opportunities facing the region and potential solutions for addressing those needs. Several key themes emerged from the outreach process that influenced the goals, objectives, and strategies including:

- The unique nature of the NCR transportation system
- Desire for more comprehensive and consistent data on the region's assets
- Acknowledgment of limited funding resources
- Critical nature of developing and expanding regional partnerships
- Removing barriers to accessing parks for all users
- Preparing the transportation network to be resilient to sustained use and environmental factors
- Positioning the region to embrace and adapt to new technologies
- Improving the safety and security of the transportation network

Transportation assets in the National Capital Region are critical to the dual NPS mission of resource protection and visitor experience. For most park units in the National Capital Region, a well-designed and maintained transportation system is the means by which visitors access and explore these nationally significant resources. Along with the significant funding gap, the National Capital Region also faces a variety of unique constraints that threaten this balance, including congestion and urban landscapes. Due to the high volume of commuter traffic traveling to and from the Washington, DC, metropolitan area, NCR park roads generally carry more traffic on average than most NPS roads, leading to additional congestion and safety issues, as well as strained facility conditions.

The National Capital Region is responsible for the allocation of investment, operations, and maintenance funding required to sustain the transportation systems of its park units. Securing the funding for this system is an ongoing, multiyear effort that incorporates input from every level of the National Park Service as well as the Department of the Interior and the DOTs.

The long-term sustainability of the National Capital Region's transportation system faces a serious financial challenge. Under the current funding forecast, the National Capital Region will not be able to fulfill the capital, operations, or maintenance needs that support the agency mission and goals. In recent years, some major transportation funding programs have leveled, dropped, or been eliminated, and the National Park Service forecasts an annual average of $36.5 million in funding for capital, operations, and maintenance needs for the period from fiscal year 2016 through fiscal year 2021. Yet annual transportation portfolio needs are estimated to be $86.8 million, leaving an annual $50.3 million unmet gap. In addition, the region faces an additional need for large-scale infrastructure investments, such as Arlington Memorial Bridge and the rehabilitation of the region's parkways. To more strategically manage the forecasted funding gap, the National Capital Region has developed an investment strategy in coordination with stakeholders and individual park units. The strategy focuses on three main components:

- ☑ Fund highest priority assets first
- ☑ Align capital and operations and maintenance investments
- ☑ Invest in new assets

Based on financial forecasting conducted, even with the significant gap in funding, following the proposed investment strategy will keep the highest priority assets (bridges and critical roads and parking) at similar conditions to today and limit the decline of condition of other assets.

Many of the strategies in this LRTP will influence project selection and the focus of the regional transportation program, including prioritizing critical assets, planning for resiliency, and maintaining safety. An increased focus has also been placed on leveraging partner funds and working with partners to improve transportation connections. Regional managers will supplement the NCR investment strategy with these strategies to aid in project selection and further leverage multiple fund sources to achieve the goals and motives outlined in the LRTP.

The National Park Service is seeking partnerships with state DOTs in Virginia, Maryland, and Washington, DC, as well as metropolitan planning organizations to identify opportunities for connections and sustainable transportation solutions that will help provide a safe and enjoyable experience for all park visitors.

NCR park use continues to rise; the experiences available in National Parks are desirable for residents and visitors from across the nation and around the world. The National Capital Region will continue to lead the region and the country in connecting people to the nation's capital and surrounding environs. This LRTP will explore opportunities to achieve a balance between transportation priorities and visitor expectations.

National Mall and Memorial Parks

Prince William Forest Park

Baltimore-Washington Parkway

Chapter 1. Planning Framework

National Capital Region Long Range Transportation Plan

The National Capital Region's Long Range Transportation Plan serves as a comprehensive overview of the transportation system condition, needs, and strategies, both currently and for the planning period during the next 20 years. This document considers national and region-specific goals, existing system needs, future investment projections, and desired system improvements, and identifies financial strategies to guide transportation decision makers at multiple levels of the National Park Service.

Transportation in the National Capital Region

Nationally, National Park Service (NPS) transportation assets provide access for more than 430 million annual visitors to the extraordinary experiences found in America's more than 400 national park units and play a vital role in serving the agency's mission. The National Capital Region (NCR) manages transportation assets within most of its 14 administrative units[1] (some park units do not have transportation assets) dispersed throughout three states and Washington, DC. These assets are critical to the dual NPS mission of achieving a balance between resource protection and visitor experience for the approximately 140 million annual visitors.

The NCR transportation assets are the primary means by which visitors access and explore the NCR park units. The transportation system in the National Capital Region is unique among NPS regions, as many of the assets, especially the parkways, function as daily commuting routes for people in the greater Washington, DC, region. This added usage creates additional challenges to maintain the assets at acceptable condition levels while balancing the needs of congestion relief and resource protection. It also underscores the need for enhanced regional partnerships.

Mount Vernon Trail

1 The NCR park administrative units are listed in Appendix B.

Transportation Assets

The NPS transportation system is defined as all surface transportation facilities and services that accommodate vehicles, transit, and nonmotorized modes. These facilities are essential to enabling visitors to access and experience the natural and cultural resources protected by the National Park Service.

The National Capital Region maintains a diverse inventory of transportation assets that facilitate the movement of visitors, staff, and equipment around its parks. These assets include roads (paved and unpaved), parking (paved and unpaved), road bridges, road tunnels, trails, trail bridges, trail tunnels, maintained landscapes[2], buildings, fuel systems, constructed waterways, marina/waterfront systems, transit systems, and railroad systems. Operations and maintenance (O&M) activities are a critical part of keeping transportation assets open and in good condition as well as sustaining transportation investments. All NPS units perform O&M activities following the different phases or categories of an asset's lifecycle.

To understand the breadth and scope of the NCR transportation portfolio, a comprehensive inventory of assets was developed using the NPS Facility Management Software System (FMSS), the FHWA Road Inventory Program, and the FHWA Bridge Inspection Program. For additional details and an inventory breakdown, refer to Chapter 3: Asset Management. The following characterize the NCR transportation system:

- Approximately 265 miles of paved roads and 86 miles of unpaved roads
- More than 260 acres of paved parking areas and 30 acres of unpaved parking areas
- A combined total of 116 road bridges and tunnel structures
- More than 293 miles of trails with 154 trail bridges and tunnels
- A combined total of 18 marinas and waterfronts
- Approximately 8 miles of navigable constructed waterways
- Approximately 3,800 acres of transportation-related maintained landscapes
- Thirty-three transportation-related buildings
- Nine fuel systems
- Approximately 34 miles of railroad tracks

The Project Process

This regional Long Range Transportation Plan (LRTP) was developed primarily during three advisory committee workshops, with input from multidisciplinary subject matter experts from the Denver Service Center, NCR office, park units, National Park Service, and Federal Highway Administration (FHWA) Eastern Federal Lands Highway Division. Recognizing the importance of partnership in the region, representatives from local jurisdictions and other local, regional, state, and federal agencies within the National Capital Region also were engaged in at least one day of each workshop. Associated technical efforts such as scenario planning, financial modeling, and visitor use assessments occurred in preparation for, and in response to, these workshop activities. The following describes the plan process, including workshops and technical work.

Prior to the first workshop, NPS staff and stakeholders participated in a **scenario planning exercise**. The scenario planning process tests various future alternatives, allowing transportation officials to compare possible scenarios and make important planning decisions based on their respective outcomes. This is an analytical tool that is often used to better prepare the transportation system to adapt to future changes. The key driving factors considered to develop different scenarios were population growth, NPS

2 Grounds that surround transportation assets such as parking areas and trailheads.

support, vehicle technology, partnership funding/support, and tolling. Scenarios were documented in the NCR Transportation Scenario Narratives technical memorandum and were presented at the first NCR LRTP workshop.

The first NCR LRTP workshop, held in December 2015, focused on defining transportation assets in the National Capital Region and identifying the plan goals and objectives. In addition, the workshop identified the issues and opportunities to be researched and addressed in the LRTP. A scenario planning exercise was presented and addressed how issues and opportunities for the transportation system would be affected by potential trends in the future. The goal area chapters within the LRTP describe these goals and objectives as well as additional baseline research activities.

Following the first workshop, NCR park unit superintendents were surveyed to evaluate the relative importance and severity of the transportation-related issues and opportunities identified by the interdisciplinary planning team. Additionally, superintendents also were asked to identify their highest-priority issues across all the LRTP goal areas, and provide any suggestions or considerations they had for project ranking criteria. The results of this survey (Appendix C) were used to refine the scope of issues and opportunities explored within the LRTP.

The **second workshop**, held in November 2016, focused on reviewing the results of the NCR superintendent's survey and identifying potential strategies by goal area to address the regional transportation issues. These strategies are presented in this chapter and also are listed in each goal area chapter with the issue or opportunity the strategy was designed to address.

The **third workshop**, held in April 2017, focused on reviewing preliminary performance measures and targets, in addition to identifying refinements to the regional goals, objectives, and strategies. The performance measures and targets are included in each goal area chapter under Measuring System Performance.

The plan identifies a broad range of regional transportation issues and time-bound priorities to create the framework for long-term investment strategies and performance measures.

The regional plan grew out of a process that included regional goal setting, a comprehensive system assessment, and fiscal analysis. The process culminated in the definition of strategic investments designed to help achieve both the NPS mission and the goals and objectives of the NCR LRTP.

The NCR LRTP focuses on five goal areas developed in coordination with the National LRTP and regional stakeholders:

Asset Management

Transportation Finance

Resource Protection

Visitor Experience

Safety and Security

Goals and Objectives

The following goal statements and objectives build on the five goal areas identified in the LRTP. The goal statements describe desired conditions. The objectives add specificity and offer a framework for identifying the specific implementation-level LRTP strategies and developing plan performance measures.

Asset Management

Goal Statement

Strategically manage, preserve, and maintain a right-sized and mission-focused portfolio of NCR transportation assets through an appropriate level of funding while sustaining long-term access to all transportation systems.

Objectives

- Maintain assets at desired condition targets following the Capital Investment Strategy (CIS)
- Emphasize core CIS goals
- Incorporate asset lifecycle costs into project programming, planning, and design decisions
- Work with partners to enhance and expand multimodal transportation systems and supporting assets
- Invest in decommissioning redundant or nonessential assets
- Address the deferred maintenance backlog of road, trail, pedestrian facility, and bridge facility needs
- Address the need to remove architectural barriers for accessibility
- Complete condition assessments for trails and other multimodal transportation systems
- Incorporate the principles of resilience into the process of improving/constructing assets

Transportation Finance

Goal Statement

Sustainably manage an appropriate level of funding to accomplish the goals of the LRTP and pursue other opportunities to expand funding.

Objectives

- Use full breadth of funding in a coordinated manner including (Federal Lands Transportation Program, Federal Lands Access Program, and other Title 16, 23, and 54 funds)
- Seek to expand funding through partnerships or reduce costs where necessary
- Strategically use NPS money to fund NCR transportation objectives

Resource Protection

Goal Statement

Incorporate the ideal of leaving park resources unimpaired into all aspects of transportation, including planning, design, construction, maintenance, operation, and disposition.

Objectives

- Maximize safety while being sensitive to fundamental park resources and values
- Remove or modify unnecessary, redundant, or underused infrastructure to restore resources and minimize maintenance costs
- Plan, construct, and operate a transportation system that minimizes impacts to resources and enhances visitor experience
- Protect and maintain cultural resources that are transportation assets

Visitor Experience

Goal Statement

Provide sustainable and context-sensitive multimodal transportation systems that support the visitor experience through universally accessible and seamless connections between parks, and to and from surrounding communities.

Objectives

- Provide seamless connections for all people in and through parks/units and to surrounding communities
- Incorporate universal accessibility into project planning and design decisions
- Implement easily accessible facilities and payment options in transportation services
- Promote multimodal transportation opportunities that are efficient and easy to use
- Provide options for scenic driving experiences and access to recreation
- Develop enforcement, policy, and other ideas on the use of commercial motor vehicles and heavy vehicles on NPS roads
- Maintain critical connections and transportation services (e.g., roadways, rolling stock)
- Mitigate congestion of “view” jams to protect safety, operations, efficiency, and traffic flow

Safety and Security

Goal Statement

Enhance the safety of transportation system users and provide a transportation system that is resilient to human-made hazards.

Objectives

- Reduce fatalities and serious injuries related to transportation
- Maximize safety while minimizing impacts to fundamental park resources and values
- Balance security needs with resource protection and with the NPS mission
- Maintain operational and emergency access
- Institute a comprehensive, performance-based transportation safety program that addresses the "Four Es" of transportation safety, which are Engineering, Education, Enforcement, and Emergency Response
- Expand strategic and operational multiagency partnerships (e.g., Coordinated Highways Action Response Team) with law enforcement and other safety stakeholders to address crashes and security concerns
- Increase staffing and available resources to assist the United States Park Police with their ability to prevent and respond to crashes

Strategies

To achieve the goals and objectives of the plan, and to address transportation-related issues and opportunities in the region, the project team identified a number of programmatic strategies. Adoption and implementation of the strategies is at the core of the NCR LRTP.

Strategies were identified by implementation time frame as **near-term, medium-term,** or **continual** (Table 1 through Table 3). **Near-term strategies** are considered highly actionable and feasible with a high degree of impact; they would be adopted or implemented during the next one to three years.

Medium-term strategies, like near-term strategies, may also have a high degree of impact, but may be dependent on the completion or initiation of near-term strategies or other agency initiatives; they would be implemented or adopted during the next three to seven years.

Continual strategies are considered common-sense best management practices that park units and regional program managers should adhere to when planning for, constructing, or operating transportation systems in the region.

Memorial Circle and Arlington Memorial Bridge

Table 1. Near-Term Strategy Summary (1–3 years)

Goal Area	Strategy
Asset Management	■ Ensure that a robust condition assessment program is in place and completed for all high-priority asset categories, which includes securing funding to execute recurring condition assessments for NPS assets. ■ Identify potential new financial resources to fund transportation O&M. ■ Conduct research to better understand the regional and public understanding of the role of the National Park Service in the transportation system, including addressing appropriate signage that would help maintain and highlight the identity of NPS facilities. ■ Work with Washington Support Office and partners to identify transportation assets vulnerable to severe weather events.
Transportation Finance	■ Identify opportunities to use shared-cost services and streamline contracting mechanisms such as supporting the use of Indefinite Delivery/Indefinite Quantity contracts. ■ Develop and disseminate guidance on best practices for incorporating nonmotorized improvements into repaving cycles or major roadway rehabilitation to save costs.
Resource Protection	■ Encourage complete and consistent reporting on asset conditions to properly address roadway needs. ■ Explore the implementation of technology to manage transportation demand and deliver traveler information in a nonintrusive manner. ■ Educate motorists (recreation and nonrecreation) on the culturally significant intent and specific design features of NPS historic transportation assets. ■ Geolocate all transportation assets, historic and nonhistoric, and conduct a systemwide risk assessment to fully understand asset risk related to severe weather events and other critical factors. ■ Ensure that the rehabilitation/reconstruction of assets includes best practice strategies to enhance the assets' resilience.
Visitor Experience	■ Establish education methods that leverage partners, media, and social media to educate the public on the role and value of NPS transportation assets. ■ Collaborate with transportation network companies (TNCs) to establish drop-off and pick-up points for NCR park units. ■ Collaborate with regional partners to install signage and other wayfinding guidance on the "last mile" between transit stops and NCR park unit entrances. ■ Support the development and use of the NPS National Congestion Management System. ■ Collaborate with partners on a regional bus management plan to establish strategies for mitigating congestion associated with multiple types of buses, including commuter, circulator, and sightseeing buses.
Safety and Security	■ Facilitate conversations with state Departments of Transportation (DOTs) partners to leverage non-NPS resources for safety-related improvements on the parkways. ■ Initiate safety planning activities on major thoroughfares to implement appropriate multimodal safety countermeasures. ■ Enhance United States Park Police coordination with local law enforcement agencies to improve crash reporting accuracy, assess jurisdictional boundary issues, and leverage enforcement resources. ■ Explore the concept of a rapid-response team to fix infrastructure improvements that would have an impact on vehicle, pedestrian, and bicycle safety.

Table 2. Medium-Term Strategy Summary (3–7 Years)

Goal Area	Strategy
Asset Management	■ Develop partnerships through which states and local jurisdictions can share responsibility for some NPS transportation issues, such as maintenance of assets, by developing an effective way to tell the shared asset/use story. ■ Develop programmatic agreements at the regional office for common O&M activities so individual units do not have to procure individual contracts or agreements.
Resource Protection	■ Develop and disseminate guidance on best management practices for preserving culturally significant transportation assets in good condition; this guidance should include special contract requirements, congestion management solutions, safety considerations, and context-sensitive design solutions for the treatment of culturally significant transportation assets. ■ Promote best practices on stormwater management. ■ Continue to incorporate sustainability into park operations by expanding the deployment of greenhouse gas emission reduction strategies.
Visitor Experience	■ Develop visitor use management plans, interpretations plans, and transportation plans for the park units that have identified medium- and high-priority needs based on increased visitor use. ■ Identify barriers to accessibility and create a Self-Evaluation and Transition Plan for each park/unit. ■ Collaborate with partners to identify disconnected parks and develop action plans to enhance multimodal access to all communities and users. ■ Establish policies that allow for ease in adopting new transportation technologies to be flexible and adapt to dynamic changes in the industry. ■ Collaborate with partners to tie in NCR park units to existing regional physical and technological infrastructure through symbiotic sharing of traveler information such as park-specific conditions and major transportation data.
Safety and Security	■ Explore partnerships with regional transportation and enforcement agencies to leverage traffic incident management tools and technology to improve response time and reduce the impacts of crashes on NPS parkway operations. ■ Employ the Safety Management System when available. ■ Establish processes and/or tools that facilitate early and continuous consultation with resource protection and visitation experts during transportation safety planning, programming, and project development.

Table 3. Continual (Best Management Practices) Strategy Summary

Goal Area	Strategy
Asset Management	■ Use project prioritization and programming based on CIS and regional investment strategy for all fund categories to ensure that the highest-priority transportation assets are brought up to, and remain in, good condition. ■ Look for education and outreach opportunities to better inform transportation and community leaders about the NPS mission and the role of transportation, and to improve the coordination of transportation systems and operations between the National Park Service and the National Capital Region partner agencies. ■ Provide adequate resources and establish a role designed to aid superintendents with the development of essential partnerships. ■ Ensure that data systems of record are kept current and accurate and use the Total Cost of Facility Ownership calculator or other tools to capture lifecycle costs. ■ Ensure financial sustainability through alignment of capital and O&M expenditures. ■ Coordinate resilience planning with state and local government agencies.
Transportation Finance	■ Build and strengthen collaborative partnerships to identify cost-sharing resources for transportation projects of all modes. ■ Identify new or creative opportunities to fund transportation projects.
Resource Protection	■ Build and strengthen collaborative partnerships with state transportation agencies and regional planning organizations to share information, best practices, and data related to cultural assets, resiliency, and air quality. ■ Build and strengthen collaborative partnerships with local transit providers, bike share programs, and other private mobility providers (e.g., TNCs); expand levels of mode choice; and educate visitors on available service to improve air quality and mitigate greenhouse gas emissions within park boundaries and on nearby facilities. ■ Improve collaboration opportunities with state transportation agencies and regional planning organizations to learn about and participate in air quality and resiliency initiatives taking place across the region.
Visitor Experience	■ Expand partnerships with the region's transit, bike sharing, and TNCs to educate visitors about multimodal access to the NCR park units, and to identify opportunities to enhance current services and wayfinding signage. ■ Leverage interpretive planning process to address thematic links between parks related to transportation. ■ Ensure regular updates of the "Plan Your Visit" websites for each park unit, including information regarding multimodal first- and last-mile access. ■ Seek opportunities to participate in conversations with local, regional, and federal partners regarding transportation technological changes, such as the rise of TNCs and connected and autonomous vehicles, that may be leveraged to improve visitor experience.
Safety and Security	■ Educate NPS parkway users on the original design and purpose of the roadway system and the safety implications of speeding. ■ Encourage complete and consistent collection of crash records to enhance location, persons, and vehicle data.

Measuring System Performance

Performance measures and performance targets for each LRTP goal area were developed to track overall progress toward LRTP goals and objectives. To the extent possible, performance measures were chosen that align with existing data and reporting systems to avoid adding additional reporting requirements to NCR park units or the creation of new tracking systems. In some cases, the performance measures and targets are similar to or support the completion of measures presented in the National LRTP (July 2017).

Where data are not presently available to track performance, but are deemed necessary to better inform future investment decisions, the suggested target is often focused on bridging data gaps to ensure data are available when the LRTP is updated. The LRTP performance measures are listed at the end of each LRTP goal area chapter.

Alignment with Planning Requirements and Existing Plans

Consistency with State and Regional Plans

Federal surface transportation legislation, as reauthorized in the Fixing America's Surface Transportation Act, requires federal land management agencies such as the National Park Service to develop LRTPs that are consistent with the continuing, comprehensive, and cooperative (3C) planning processes required of state DOTs and metropolitan planning organizations (23 United States Code [USC] §201; 23 USC §134 and §135).

This plan is consistent with those processes and legal requirements. Similarly, Virginia, Maryland, West Virginia, the District of Columbia, and Metropolitan Washington Council of Governments, the metropolitan planning organization for the greater Washington, DC, region, all prepare transportation plans in accordance with the same regulations. These plans share many of the same goals and priorities. It is critical for transportation projects to be coordinated across jurisdictional boundaries and to ensure the impact of improvement is analyzed within a regional context. Table 4 demonstrates how the NCR LRTP aligns with USDOT planning factors.

Alignment with Other Plans

The NCR LRTP also is aligned with other NPS and Department of the Interior plans, policies, and management tools. This includes the National LRTP (July 2017) and other regional LRTPs. Iterative feedback among the national, regional, and park unit levels will inform and strengthen future updates to each plan.

Other plans have helped lay the groundwork for this plan including, but not limited to:

- A Call to Action[3] (NPS 2015)
- NPS Capital Investment Strategy[4] (NPS 2012)
- Healthy Parks Healthy People Strategic Action Plan[5] (NPS 2011)
- Green Parks Plan[6] (NPS 2012)
- America's Great Outdoors[7] (CEQ et al. 2011)
- NCR Paved Trail Study[8] (NPS 2016)

3 https://www.nps.gov/calltoaction/

4 http://inside.nps.gov/waso/custommenu.cfm?lv=1&prg=6&id=10805 – Note: NPS Internal Link Only

5 https://www.nps.gov/public_health/hp/hphp.htm

6 https://www.nps.gov/greenparksplan/

7 https://www.whitehouse.gov/administration/eop/ceq/initiatives/ago

8 https://www.parkplanning.nps.gov/document.cfm?documentID=74623

Table 4. Comparison of NPS Goal Areas and USDOT Planning Factors

	NCR LRTP Goal Areas				
USDOT Planning Factors	**Asset Management**	**Transportation Finance**	**Resource Protection**	**Visitor Experience**	**Safety and Security**
Economic Vitality	●	●	●	●	
Safety	●			●	●
Security				●	●
Accessibility and Mobility	●			●	●
Environment	●		●		
Connectivity	●			●	
Efficiency	●	●	●	●	
System Preservation	●	●			
Resiliency and Reliability	●		●		●
Travel and Tourism				●	

Putting the Plan Into Action

The NCR LRTP is a strategic, long-range plan that provides guidance to programs and managers throughout the National Capital Region. It does not replace decisions made at the park unit or program levels. The NCR LRTP will be implemented through the actions of existing programs and managers in alignment with their priorities and procedures, and in partnership with regional entities.

Following the plan's release, the National Capital Region will organize action planning and reporting teams and establish performance monitoring protocols. A performance report will be published approximately two years after the plan is released, with a second performance report after four years.

These reports will inform the updates to the LRTP, which will be an opportunity for the region to reexamine and reevaluate transportation priorities. The first LRTP update is targeted for release five years after this plan is published.

George Washington Memorial Parkway

Chapter 2. National Capital Region Investment Strategy

National Capital Region Long Range Transportation Plan

Investment Strategy Principles

The NCR Transportation Investment Strategy provides a framework to meet the goals, objectives, strategies, and performance metrics identified in this plan. The principles of the strategy will help guide how NCR resources are invested in the future. A financial analysis was used to understand the current conditions of the National Capital Region's transportation assets and where limited funding could be spent to achieve the best results for system users. The chosen investment strategy allocates the National Capital Region's annual forecasted budget of $36.5 million (from fiscal year 2016 through fiscal year 2021) primarily to improving the conditions of highest-priority road and bridge assets. The investment strategy principles and the results of this funding allocation are shown in Figure 2 .The percent totals do not add up to 100%, as there may be duplication amongst funding the different strategies.

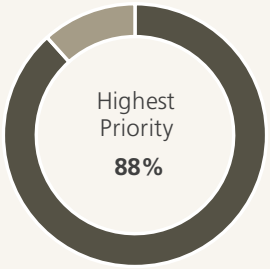
Rock Creek Park

Figure 2. Principles of the NCR Transportation Investment Strategy

Fund Highest Priorities First

The strategy focuses funding on improving the conditions for the highest-priority assets, which are typically the most crucial to meeting the agency mission. Highest-priority assets include the following:

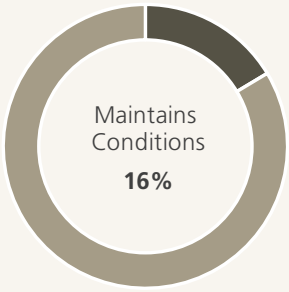
- All functional classification (FC) 1 and 7 paved roads and parking
- All bridges
- All transit
- Other assets in optimizer band (OB) 1



88% of transportation funding will be invested in improving the condition of highest-priority assets (12% is for other priority assets)

Align Capital and Operations and Maintenance Investments

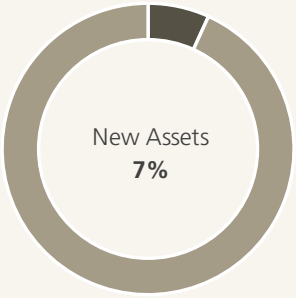
The strategy focuses a modest amount on operations and maintenance (O&M), which funds activities such as facility operations and preventative maintenance to keep assets in good condition, longer. It stresses that capital and O&M investments align to the same portfolio of highest-priority transportation assets.



16% of transportation funding will be invested in O&M activities that keep assets in good condition longer (84% is for improving assets, planning, and administration)

Invest in New Assets

The strategy sets aside $2.5 million annually for the development of new transportation assets and for use in partnerships, as matching funds. Examples of new assets include targeted expansions to nonmotorized trails and technology upgrades.

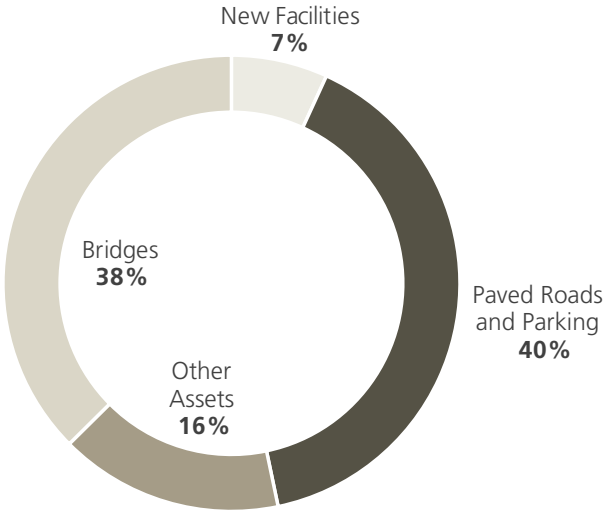


7% of transportation funding will be invested in new assets (93% is for existing assets)

NCR Transportation Investment Strategy

The NCR Transportation Investment Strategy provides funding for all categories of transportation assets. Paved roads and parking areas receive the highest share at 40%, but bridges are a close second with 38% of the funding. Together, these assets comprise the largest portion of the NCR transportation portfolio, are used by the greatest number of commuters and visitors, and are in most need of condition improvements. The remaining 23% is reserved for other asset types (e.g., trails, waterways) as well as approximately $2.5 million annually for new facilities.

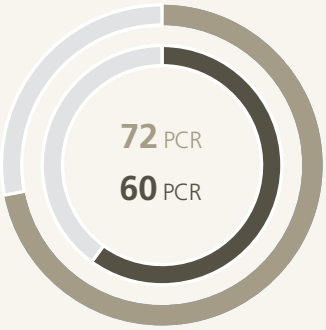
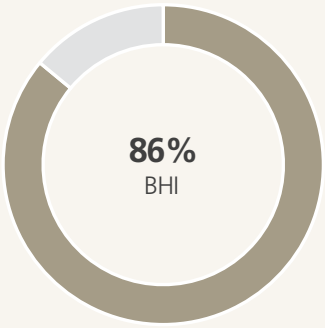
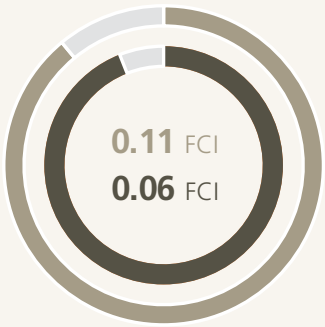
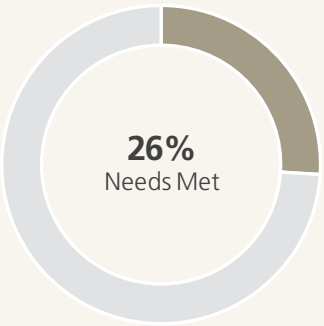
Figure 3. Average Distribution of Investments by Asset Category in the NCR Investment Strategy



Six-Year Expected Outcomes

The NCR Transportation Investment Strategy is fiscally constrained. Because financial needs exceed available resources, the strategy balances competing investment priorities to meet the performance goals of the plan. The majority of the annually forecasted funding ($36.5 million) during the next six years is focused heavily on improving the conditions of roads, parking, and bridges. These assets are especially critical to moving commuters and visitors throughout the region by the safest means possible. Figure 4 shows modeled six-year conditions outcomes based on the NCR Transportation Investment Strategy, using NPS pavement, bridge, and asset management modeling systems.

Figure 4. NCR Transportation Investment Strategy Expected Six-Year Outcomes by Asset Category

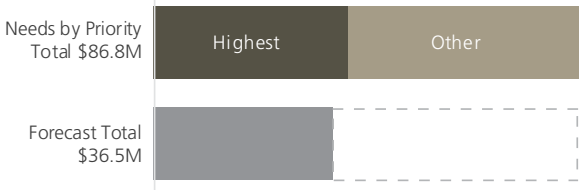
Asset Category[1]	Condition Outcomes	O&M Outcomes
Paved Roads and Parking The NCR Transportation Investment Strategy results in a 72 Pavement Condition rating (PCR) for the highest-priority (FC 1 and 7) paved roads and parking areas. By funding improvements to enhance the condition of these assets, they can be maintained at the boundary of fair and poor condition. While the focus is on the highest-priority assets, this does not come at the detriment of lower-priority roads and parking (FC 0, 2–6, 8). The strategy establishes a "floor" for the lower bound of acceptable condition of 60 PCR, so these roads also will be maintained in fair condition. Under this strategy, all paved roads and parking areas will receive 100% of the O&M funding needed to sustain these assets during their lifecycles.		
	Highest Priority (FC 1,2) All Other Priority Roads	
Bridges All bridges under this plan have been classified as highest-priority assets. Accordingly, NCR bridges also will receive 100% of expected needed O&M to ensure their long-term health and functionality. The NCR Investment Strategy results in an 86% Bridge Health Index (BHI) for the entire NCR bridge portfolio, which is fair condition.		
Other Assets The NCR Transportation Investment Strategy will result in a Facility Condition Index (FCI) of 0.11 (fair condition) for highest-priority (OB 1) transportation assets in other categories. The assets not classified as highest-priority are currently in good condition and will be maintained as such, with only a slight decline in condition during six years. O&M funding for these facilities will achieve 26% of identified need.		
	Highest Priority (OB 1) Other Priorities (OB 2, 3, 4, 5)	

1 Facility classifications and condition ratings are described in Chapter 3: Asset Management.

Strategy Development

Regional transportation stakeholders and partners, NCR staff, and NCR park superintendents critically examined a number of potential investment strategies. Each strategy invested forecasted funding according to different principles to identify the best possible solutions to meet the goals of this plan. Through research, analysis, and discourse, the preferred NCR Transportation Investment Strategy was chosen. The principles balance funding across high-priority roads and bridges and makes modest investments in new assets. The final investment scenario also aligns with priorities in the National Transportation Investment Strategy.

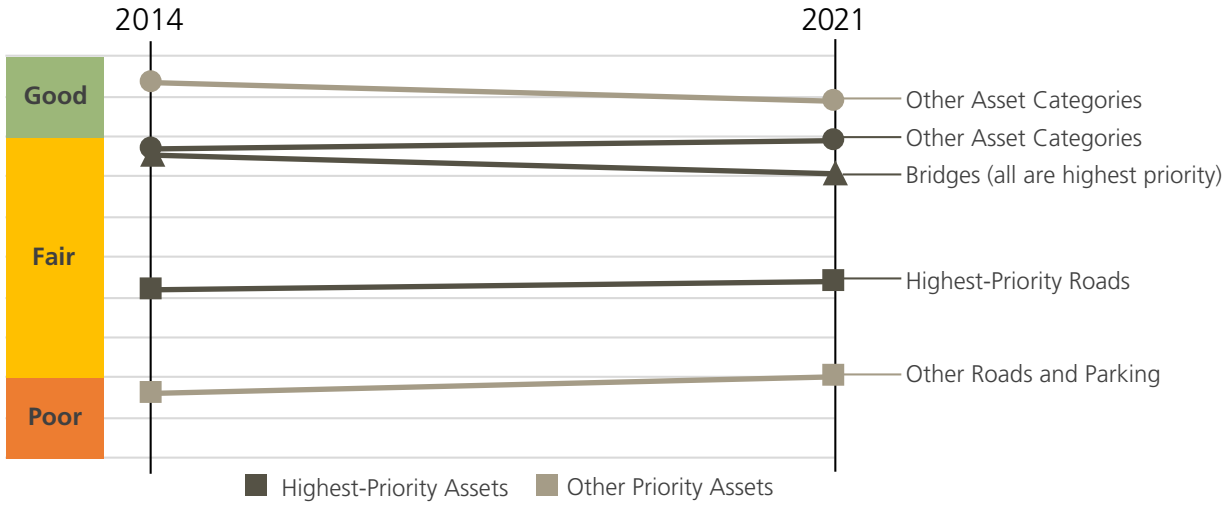
Figure 5. Comparison of Annual Needs to Forecasted Available Funding



Financial Needs Far Outweigh Available Funding

The National Capital Region is focusing on its highest-priority road and bridge assets, at the expense of lower priority road assets (although these will not be allowed to deteriorate to poor condition). FC 1 and 7 roads are arguably the National Park Service's most important roads and bridges, making critical connections that are essential. These assets can be maintained near their current conditions with available funding, while others cannot. Segmenting the asset portfolio into "highest" and "other" priority groupings will enable the National Capital Region to demonstrate results for both the assets it can afford to maintain, as well as those it cannot, as illustrated by the shortfall in the funding forecast relative to total needs (Figure 5). Figure 6 shows that when 85% of all transportation funds are invested in highest-priority assets, these are forecasted to stay at similar "fair" condition levels. Also important to note is "other" assets are not expected to decline very much, if at all.

Figure 6. Relative Forecasted Changes in Transportation Asset Condition for the National Capital Region



Implementation

The NCR Transportation Investment Strategy provides principles for how and where to invest critical dollars to ensure transportation assets are improved upon and maintained. These investments are critical to meeting the goals, objectives, strategies, and performance metrics in the plan. The National Capital Region will put these principles into practice, changing the way transportation funding is spent. Implementing the strategy will be hard work, but the National Capital Region will collaborate with the superintendents and staff from each park unit, as well as non-NPS transportation stakeholders. The ultimate goals of this coordination will be to invest in enhancements to, and expansion projects for, the National Capital Region's multimodal transportation systems and supporting assets. This will result in a safer, more sustainable, and more effective transportation system.

Piscataway Park

Belle Haven Marina

Rock Creek and Potomac Parkway

Chapter 3. Asset Management

National Capital Region Long Range Transportation Plan

Goal Statement

Strategically manage, preserve, and maintain a right-sized and mission-focused portfolio of NCR transportation assets through an appropriate level of funding while sustaining long-term access to all transportation systems.

Objectives

- Maintain assets at desired condition targets following the Capital Investment Strategy(CIS)
- Emphasize core CIS goals
- Incorporate asset lifecycle costs into project programming, planning, and design decisions
- Work with partners to enhance and expand multimodal transportation systems and supporting assets
- Invest in decommissioning redundant or nonessential assets
- Address the deferred maintenance (DM) backlog of road, trail, pedestrian facility, and bridge facility needs
- Address the need to remove architectural barriers for accessibility
- Complete condition assessments for trails and other multimodal transportation systems
- Incorporate the principles of resilience into the process of improving/constructing assets

Introduction

The NPS transportation system is defined as all surface transportation facilities and services that accommodate vehicles, transit, and nonmotorized modes. These facilities are critical to enabling visitors to access and experience the natural and cultural resources protected by its parks.

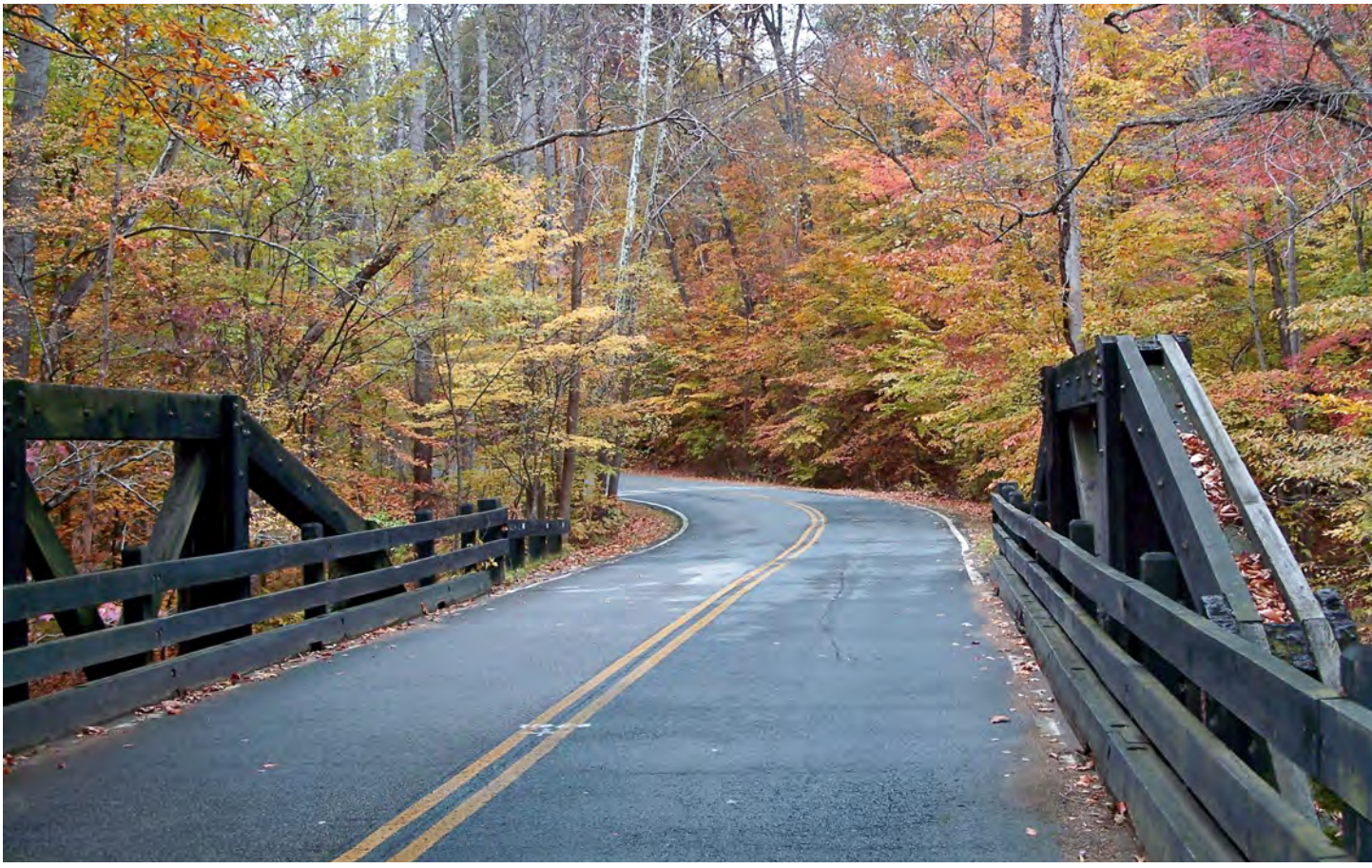
In addition to providing access and visitor experience, the NCR transportation system (e.g., NCR parkways) plays a significant role in regional mobility and comprises a significant portion of the highway system for the metropolitan Washington region. While the average NPS road in other parts of the country may only carry 1,000 to 2,000 vehicles per day, multiple parkways in the National Capital Region experience traffic demands in the range of 50,000 to 100,000 vehicles per day. Many of these roadways, especially parkways, are primary commuting corridors in addition to being used for recreational visitation. As a result, while the closure of many park roads in other NPS regions may result in localized congestion and travel impacts, the closure of any section of the NCR parkway system can quickly translate into large-scale and widespread roadway congestion throughout the metropolitan area, which includes more than 5 million residents.

Current and forecasted budget constraints make it difficult to sustain all transportation assets in their current condition, let alone improve them. Given these constraints, it is critical to know the inventory, condition, and importance of the transportation assets to prioritize investments. Keeping track of such a large and complex network of transportation assets in an efficient and effective manner is one of the challenges that the National Capital Region faces. The National Park Service uses multiple tools and expends significant resources to help organize and track asset inventory and condition, and is consistently seeking out innovative ways to streamline these processes.

A key strategy to reducing long-term costs involves balancing the expenditures on capital improvements and operations and maintenance (O&M) activities. Total cost of facility ownership (TCFO), a lifecycle accounting concept at the heart of NPS transportation facility management, recognizes that assets require investment throughout their service lives, and that preventative maintenance (PM) and facility operations activities are important. Asset lifecycles can be extended, and total costs lowered, with a properly funded maintenance program.

Funding constraints are not the only facility management challenge facing the National Capital Region; adapting to the effects of severe weather events also is a present and growing challenge. NPS transportation facilities were built to withstand historical climatic conditions with regular maintenance. However, changes in air and water temperature, precipitation, and sea level have already been observed and are projected to become more significant. Changes in extreme weather events, such as increased flooding, are expected to increase in terms of both magnitude and frequency across the region, and will likely lead to new transportation asset management challenges that must be systematically considered and accounted for when making transportation investment decisions.

Prince William Forest Park



Baseline Conditions and Trends

Transportation Asset Inventory

The National Capital Region maintains a diverse inventory of transportation facilities that allow for the movement of recreational and non-recreational visitors, staff, and equipment within and around its park system. With a wide range of asset types, an inventory definition is critical to understanding the operations, maintenance, rehabilitation, and associated financial considerations required to properly operate the transportation network. Table 5 and Figure 7 provide a breakdown of the transportation assets in the National Capital Region. A detailed description of each asset type can be found in Appendix D. This data was obtained from the 2015 FMSS year-end database.

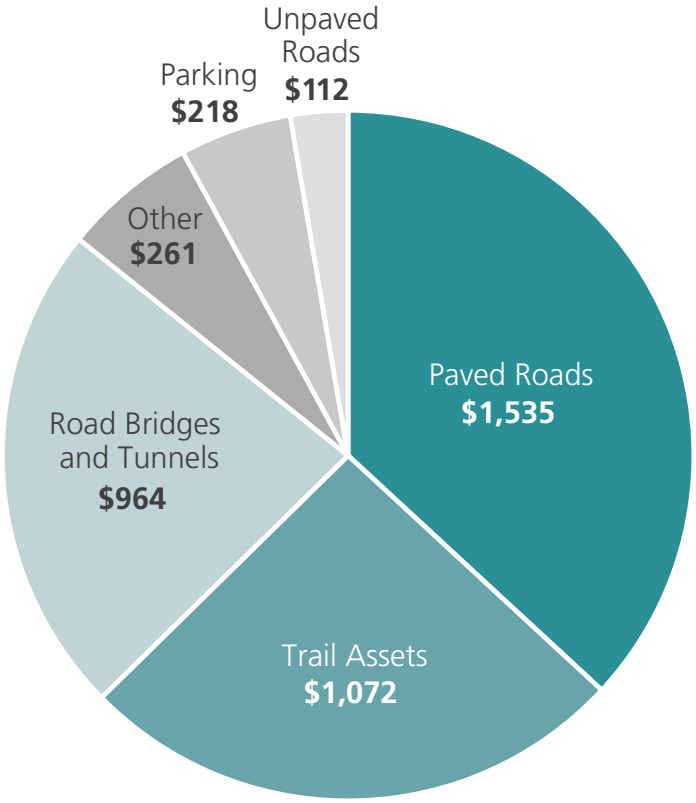
Table 5. Summary Inventory of the Total Transportation Assets in the National Capital Region

Source: 2015 year-end FMSS data; quantities for paved assets and road bridges and tunnels from Road Inventory Program (RIP)/Bridge Inspection Program.RIP

Asset Category	Count	Quantity	Unit	CRV (in Millions of Dollars)*	DM (in Millions of Dollars)**
Paved Road and Bridge Network					
Paved Roads	286	265	Miles	$1,535.4	$319.2
Paved Parking	338	11,337,216	Square Feet	$204.7	$48.7
Road Bridges and Tunnels	116	999,636	Square Feet	$963.7	$312.2
Total	**785**			**$2,703.8**	**$680.1**
Other Transportation Assets					
Unpaved Roads	163	860	Miles	$111.7	$2.2
Unpaved Parking	101	1,317,449	Square Feet	$13.7	$0.6
Trail	235	292.5	Miles	$797.3	$40.6
Trail Bridge	152	506,688	Square Feet	$224.5	$24.5
Trail Tunnel	2	271,878	Square Feet	$49.9	$1.0
Building	33	105,557	Square Feet	$32.2	$2.8
Fuel System	9	19,002	Gallons	$805.5	$0.04
Constructed Waterway	9	8	Miles	$50.7	$5.3
Marina/Waterfront System	18	5,320	Linear Feet	$3.6	$0.001
Railroad System	12	180,384	Linear Feet	$173.9	$1.9
Total	**734**			**$226.3**	**$78.9**
Grand Total	**1,519**			**$2,930.1**	**$759**

* Current Replacement Value (CRV) ** DM

Figure 7. Total Transportation Assets and Current Replacement Value in the National Capital Region (Total Transportation Asset Current Replacement Value in Millions of Dollars)



Condition

The National Park Service uses industry-standard metrics to assess asset condition and to estimate investment needs. For the most common transportation asset categories—paved roads, paved parking areas, and bridges—the National Park Service partners with the Federal Highway Administration (FHWA) to inspect these assets and assess their condition using automated tools and engineering expertise. Facility Management Software System (FMSS) (an industry-standard software package customized for the National Park Service) fiscal-year-end reports are the official sources for most NPS asset information. Unless otherwise stated, the NCR LRTP uses 2015 FMSS year-end data.

Current Replacement Value

CRV indicates necessary total expenditure in current dollars required to replace a facility to meet current acceptable standards of construction and comply with regulatory requirements.

Deferred Maintenance

DM is maintenance that was not performed when it should have been or was scheduled to be. Continued deferment of required maintenance results in impaired asset performance.

Facility Condition Index

FCI provides an indication of the condition of assets where:

$$\text{Facility Condition Index} = \frac{\text{Deferred Maintenance}}{\text{Current Replacement Value}}$$

Pavement Condition

Poor pavement quality can be uncomfortable or even jarring for visitors, and can increase wear and tear on vehicles, decrease vehicle fuel economy, and reduce roadway safety. Poor pavement quality also can contribute to accelerated deterioration as pavement degrades in a non-linear pattern over time. Through regular inspection and proactive maintenance of paved assets, the National Park Service seeks to minimize total lifecycle ownership costs while keeping roads and parking areas in good condition.

Paved roads and parking areas are jointly monitored by the National Park Service and the FHWA through the RIP. RIP inspects paved surfaces using automated, industry-standard equipment, and provides inputs to pavement management models that estimate recurring maintenance (RM) and component renewal (CR) needs. This process helps the National Park Service target funds to projects that will make the biggest improvements to system pavement condition per dollar spent.

Pavement Condition Rating (PCR) is an industry-standard condition metric used by the National Park Service. PCR is measured on a scale from 0 to 100, with a score of 100 indicating perfect condition (Table 6).

Table 6. Pavement Condition Rating Thresholds

PCR	Condition
≥ 85	Good
61 ≤ and ≤ 84	Fair
≤ 60	Poor

The National Park Service has historically sought to achieve and sustain an average PCR of 85 across its paved roadway system, which is considered the threshold for "good" condition. It is easier and less costly to maintain pavement already in good condition using less-expensive RM and CR pavement preservation techniques, rather than the costlier CR techniques and capital improvement (CI) investments that are necessary for pavement in poor condition.

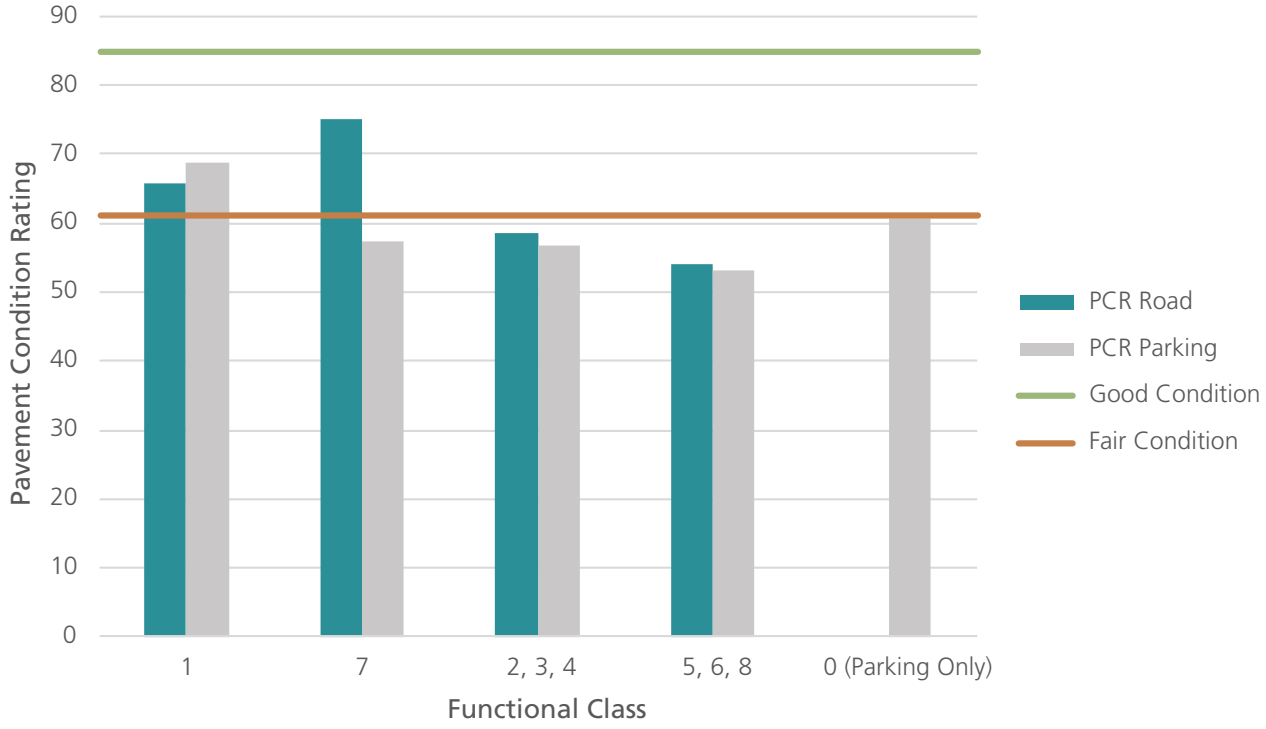
On average, paved roads in the National Capital Region present "fair" conditions with a PCR of approximately 63. On the other hand, parking facilities present "poor" conditions in the region with average PCR of approximately 49.

Table 7. Road Functional Classifications

Functional Classifications	Roadway Type
1	Principle park road
2	Connector park road
3	Special purpose park road
4	Primitive park road
5	Administrative access road
6	Restricted road
7	Urban parkway
8	City street

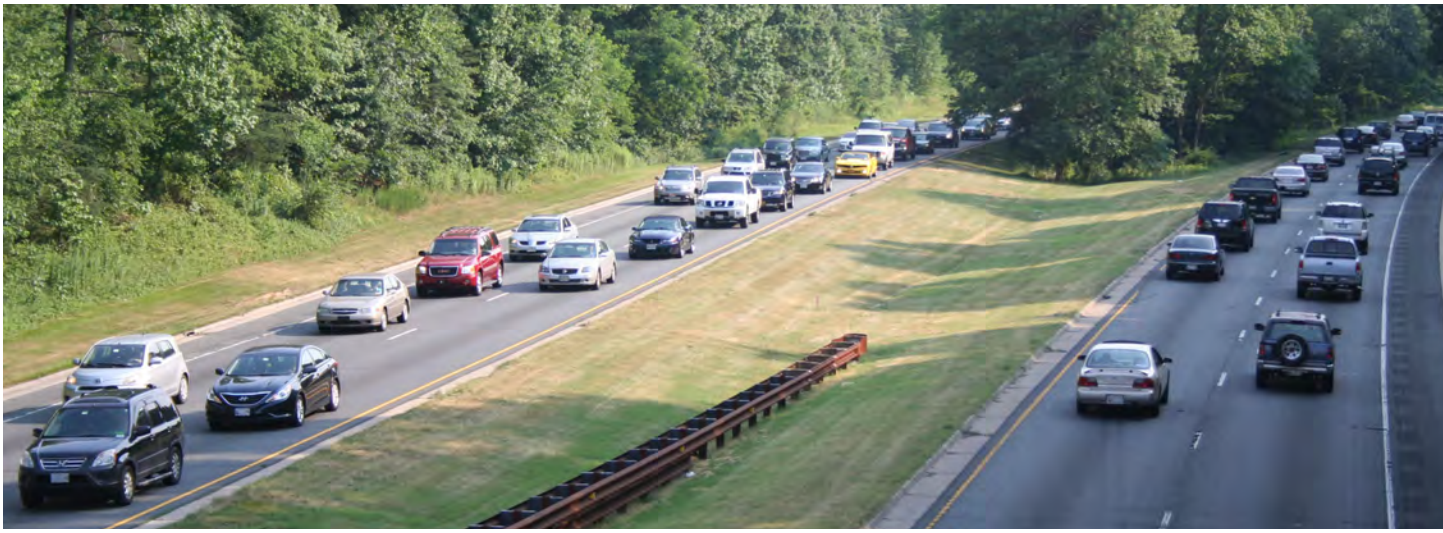
Figure 8. Average Pavement Condition Rating of NCR Paved Roads and Parking

Source: Fiscal Year 2015 year-end FMSS data
Note: Parking lots classified under FC 0 are not adjacent to any NPS roads.



According to the 2015 NPS Condition Report, the NCR primary public roads, or roads in functional classes 1, 2, and 7, are in the best condition with an average PCR of approximately 76 ("fair" condition rating). Other NCR public roads in functional classes 3 and 8 have an average PCR of approximately 53, which reflect poor condition. Figure 8 shows the average PCR of paved roads and parking. With current and projected future funding levels, regional pavement condition will likely decline consistently during the coming years.

Baltimore-Washington Parkway



Bridge Condition

Similar to roads, NPS road bridges are inventoried through the Bridge Inspection Program established with the FHWA.

Inspections are conducted by the FHWA typically on a two-year cycle. The Pontis software program was developed as a part of this program to help systematically collect and analyze the data to make forecasts and recommendations for bridge maintenance, rehabilitation, and replacement programs and policies. Pontis software uses a Bridge Health Index (BHI) to rate bridges as "good," "fair," and "poor" based on structural condition, erosion around bridge piers and abutments, and the rate of deterioration. The BHI values range between 0% and 100%, with 100% indicating perfect condition. The remaining scores are broken down in Table 8. It should be noted that a "poor" rating for BHI does not necessarily indicate that a bridge is unsafe to drive upon.

Table 8. Bridge Health Index Thresholds

Bridge Health Index (BHI)	Condition
> 91%	Good
80% ≤ and ≤ 91%	Fair
< 80%	Poor

Figure 9 shows the breakdown of the NCR bridges included in the National Bridge Inventory by condition according to BHI. According to the most recent Pontis report, as of October 2016, more than half of the bridges are in fair or poor condition.

Across the NPS system, a significant proportion of bridges were constructed between 1940 and 1970, and these structures are now entering the second half of their service lives. As shown in Figure 10, close to 70% of bridge structures have an age greater than 40 years, and about 58% have ages greater than 50 years. These bridges will require more intensive investment than in the recent past to keep them in good operating condition. As with regional pavement, current and projected future funding levels are not sufficient to maintain all bridge structures in good condition. Maintaining bridges in good or fair conditions will become more difficult as bridges continue to age and rehabilitation and reconstruction costs increase.

Figure 9. Distribution of NCR Bridges by Bridge Health Index Category

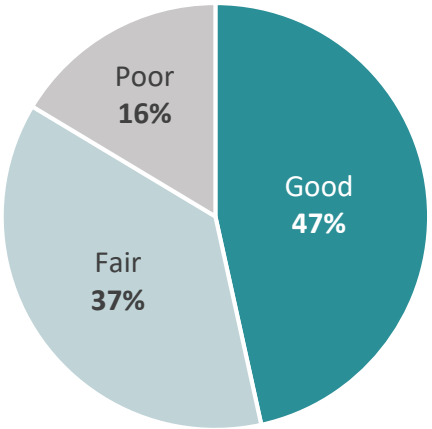
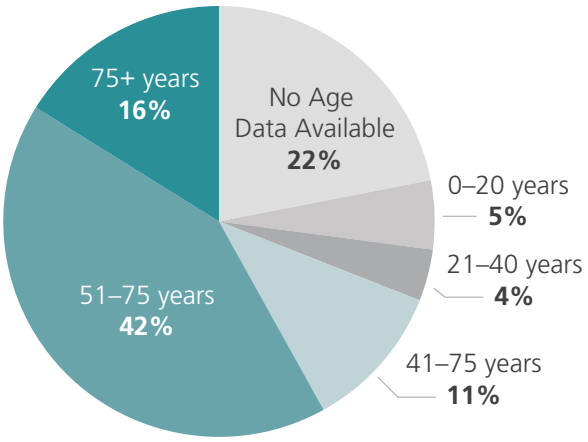


Figure 10. Distribution of NCR Bridges by Age



Condition of Other Transportation Assets

The NPS paved road and bridge network constitutes the majority of NPS transportation assets. However, other transportation assets (e.g., unpaved roads and parking areas, trails, docks, constructed waterways, and alternative transportation systems) also are essential parts of the NPS transportation system.

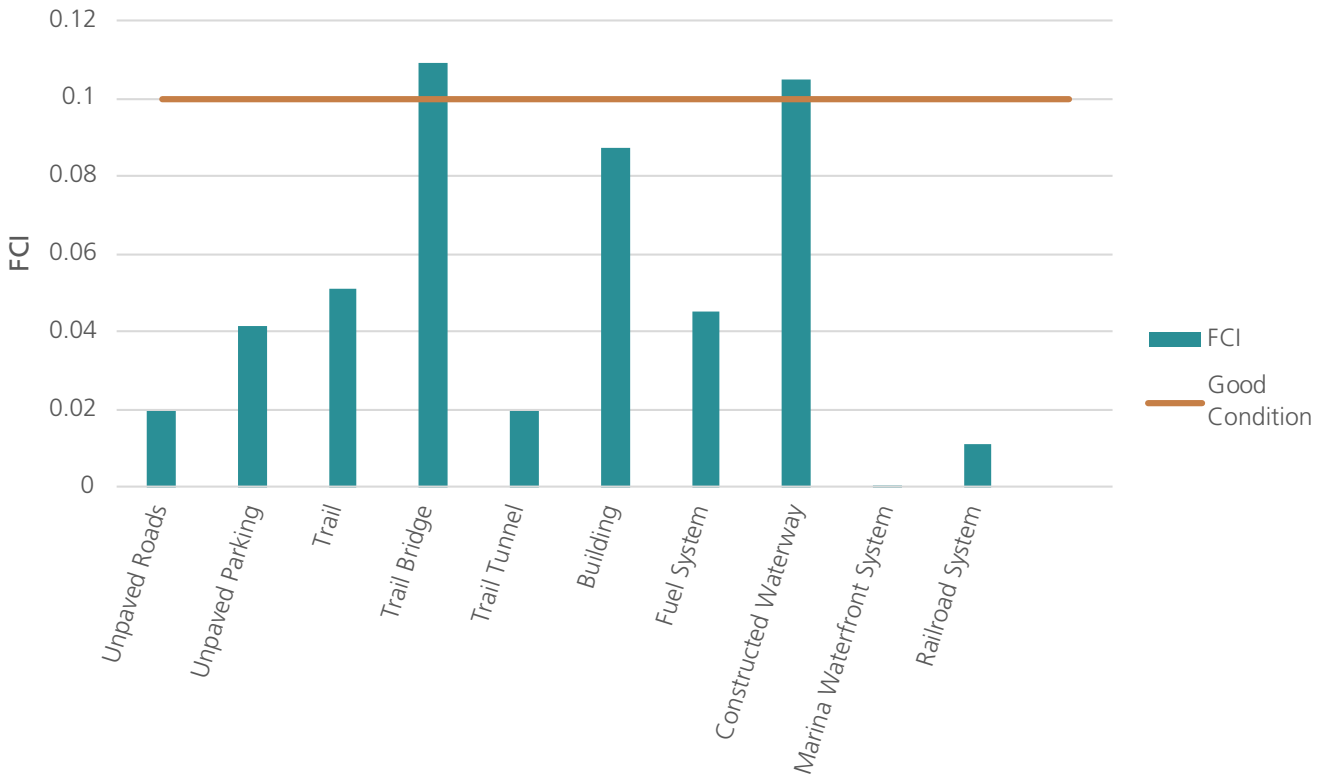
To assess the condition of other transportation assets, the National Park Service uses a Facility Condition Index (FCI), which represents the estimated cost of DM divided by the asset's CRV. DM for all assets are tracked in the FMSS. An FCI of 1.0 would suggest full replacement. Figure 11 shows the FCI of assets by type.

Table 9. Facility Condition Index Rating Scale

FCI Rating	Condition Rating
≤ 0.100	Good
0.101–0.150	Fair
0.151–0.500	Poor
> 0.500	Serious

Figure 11. Average FCI of NCR Transportation Assets by Type

Notes: Does not include paved assets or bridges; FCI 0.1 target is for highest-priority assets only.



Trail Condition

Trails, sidewalks, paths, and walkways provide critical transportation services, provide alternatives for users, and may serve as the primary or sole mode of access to some park units.

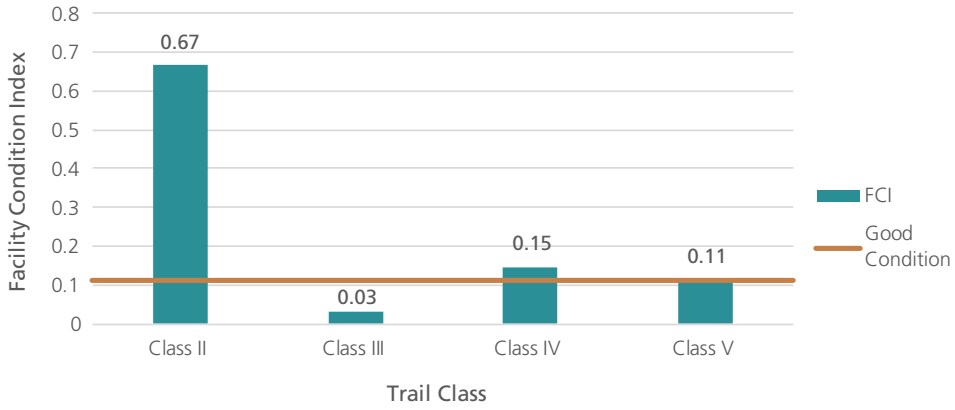
While the overall condition of trails in NCR park units is considered "good,"(Figure 12) in some cases, the trails providing access to key attraction sites have deteriorated to the point where visitor safety is at risk. There are currently 21 miles of trail with a condition ranking of "poor" or "serious." "Poor" indicates an FCI greater than 0.15, while "serious" indicates a FCI greater than 0.5. These assets account for a total DM backlog of $20.9 million.

Table 10. NPS Trail Classes

Trail Class	Description
Class I	Minimally Developed/Undeveloped Trail
Class II	Simple/Minor Development Trail
Class III	Developed/Improved Trail
Class IV	Highly Developed Trail
Class V	Fully Developed Trail

Figure 12. Facility Condition Index of NCR Trails by Class

Notes: Data not available for class I trails.



Operations and Maintenance

O&M activities are a critical part of keeping transportation assets open and in good condition as well as sustaining transportation investments. All NPS units perform O&M activities following the different phases or categories of an asset's lifecycle. These activities, referred to as work types, are:

- **Facility Operations (FO):** Activities that ensure the day-to-day operation of transportation systems (such as snow removal and plowing, grounds care, litter and trash pickup)
- **Preventative Maintenance (PM):** Maintenance tasks performed on an annual or more frequent basis (grading, brushing, cleaning culverts, inspection, vegetation control, sealing/patching, washing)
- **Recurring Maintenance (RM):** Less-frequent maintenance tasks performed on a cycle of one to 10 years (restriping, crack sealing, overlay, repointing, repainting, tread repairs, light repairs)

Except for certain RM activities,[1] these activities do not improve the condition of assets; rather, they are the day-to-day work required to keep assets open and functioning and the PM projects designed to make sure capital investments are sustained for as long as possible. The facility operations and PM stages in the asset lifecycle are essential to minimizing long-term or TCFO costs. Similarly, fully funded and properly executed PM and RM activities can significantly extend the useful life of transportation assets, reducing future needs for CR and CI investments and minimizing long-term lifecycle costs. As noted previously, some RM activities, such as mill and overlay, are considered CI activities by the FHWA because they generally improve the overall condition of the asset. These activities should therefore not be included in O&M.[2]

Monocacy National Battlefield

1 Some RM activities, as defined by the National Park Service, are considered capital improvement activities by the FHWA

2 The O&M need is quantified and explained in more detail in Chapter 4: Transportation Finance.

Optimization of Assets

NPS park units use a combined ranking of asset importance and condition called the "Optimizer Band (OB)" to identify highest- and high-priority assets in a unit. OBs specify the level of O&M funds a unit plans to dedicate to a given asset. Band values are 1, 2, 3, 4, and 5, and are initially calculated using the FCI and asset priority index (API) values of a particular asset.

Parks have the discretion to reassign assets to different OBs, but must do so within their constrained budget. OBs inform the Financial Sustainability category of the NPS CIS project scores.

Asset Priority Index (API)

The API is a measure of the importance of an asset to the mission of the park where it is located. API values range from 1, for little or no importance to 100, for most important. "mission critical" assets are assigned an API of greater than 75, "mission dependent" assets have API values between 21 and 75, and assets with an API value of less than 21 are designated "no impact."

The thresholds used to define the bands are shown in Table 11.

Table 11. Optimizer Band Thresholds

Source: Capital Investment Strategy Guidebook, 2012 (NPS 2012)

Band	API lower bound	FCI lower bound	Maintenance Level
1	88	0.15	Highest
2	75	0.3	High
3	50	0.75	Medium
4	21	1.0	Low
5	1	>1.0	Lowest

As shown in Figure 13, assets assigned to bands 1 and 2 account for 78% of NCR transportation assets by CRV. Targeting maintenance funds according to CIS guidelines should result in a reduction in the (DM) backlog and improvements in the condition of these assets over time. The CIS provides requirements for the minimum percentage of planned PM spending based on OB as follows:

- OB 1: 55%
- OB 2: 50%
- OB 3: 25%
- OB 4/5: No requirement

Conversely, the condition of lower-priority assets will likely decline at an accelerated rate, as some of their currently allocated O&M funds would be relocated to higher-priority assets.

Deferred Maintenance

Due to funding shortfalls, not all necessary or recommended maintenance activities can be performed for all transportation assets in each year. This leads to DM, a measure of the accumulated total costs necessary to correct deficiencies resulting from unaccomplished past recommended maintenance and repairs. As shown in Figure 14, the estimated DM backlog for transportation assets in the National Capital Region is $762 million, which is almost 20% of the assets' CRV.

Paved roads, paved parking areas, bridges, and tunnels account for about $680 million of DM (including Arlington Memorial Bridge), and other assets account for the remaining $81.8 million of the total. DM for the Arlington Memorial Bridge alone accounts for $238.5 million, leaving an estimated $441.2 million in DM for the remaining paved assets in the National Capital Region.
OBs 1 and 2 make up approximately 87% of the DM needs.

Figure 13. NCR Transportation Asset Current Replacement Value by Optimizer Band

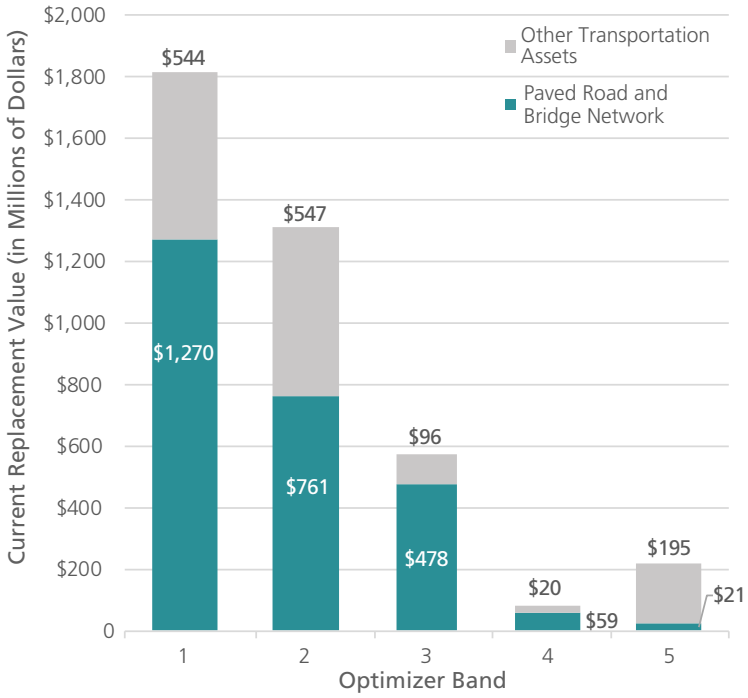
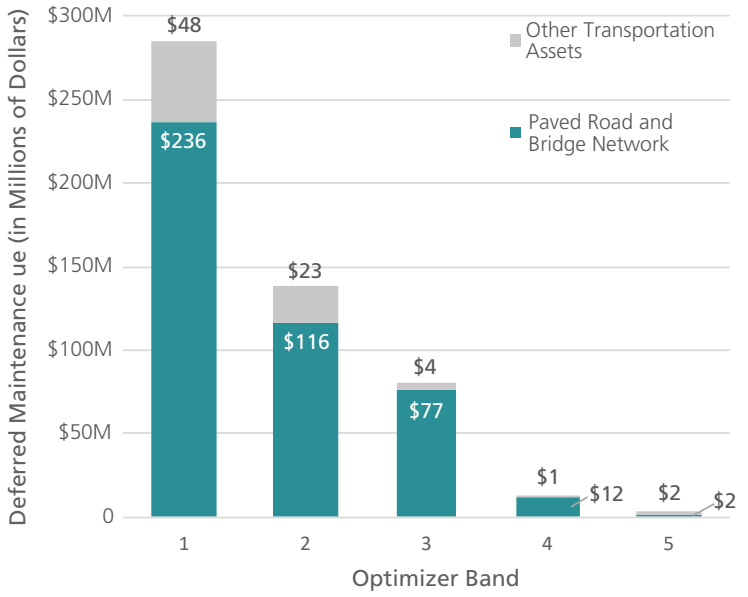


Figure 14. NCR Transportation Asset Deferred Maintenance by Optimizer Band



Transportation Asset Adaptation and Resilience

Global climate change presents new challenges for transportation asset management. Typically, transportation infrastructure has been designed to withstand a range of historical seasonal fluctuations in temperature and precipitation, as well as occasional extreme weather. However, if future conditions continue to exceed historical norms on a more-frequent basis, the condition, function, and longevity of transportation facilities may be adversely affected. Changes in temperature, precipitation, and sea levels may accelerate degradation of physical assets and, in the most extreme cases, may result in catastrophic damage or loss. Extreme weather and severe storms will continue to disrupt transportation systems, with the potential for major impacts to safety, visitor access, and resource protection.

Impacts of climate change have already been observed, and they are expected to increase in severity over time. It will become increasingly necessary to adapt existing transportation assets and ensure that any investments in new assets are resilient to changing conditions.

Facility Adaptation and Resilience

To mitigate climate change impacts on its transportation portfolio, the National Park Service is proactively pursuing two asset management strategies: facility adaptation and resilience.

Adaptation

Adjustment in natural or human systems in anticipation of or response to a changing environment in a way that effectively uses beneficial opportunities or reduces negative effects.[1]

Resilience

The ability to anticipate, prepare for, and adapt to changing conditions, and respond to and recover rapidly from disruptions.[2]

1 From Executive Order 13653 section 8(b).
2 From Executive Order 13653 section 8(c).

National Capital Parks – East

Regional Issues and Opportunities

Condition Assessment

It is the responsibility of the National Park Service to preserve, maintain, and manage existing transportation assets and services. To do so, it is important to analyze lifecycle costs and ensure that current assets can be perpetually maintained at desired condition targets. In cases where NPS assets are operated and maintained by outside groups, such as concessioners and partner organizations, condition assessments should be completed to ensure that all park assets are properly maintained. Currently, there is insufficient condition assessment data or regular assessment cycles for trails and all other non-road assets, which are critical to ensuring asset conditions are tracked over time and maintenance backlogs are addressed to the extent possible.

Recommended Strategies

- Ensure that a robust condition assessment program is in place and completed for all high-priority asset categories, which includes securing funding to execute recurring condition assessments for NPS assets.
- Use project prioritization and programming based on CIS and regional investment strategy for all fund categories to ensure that the highest-priority transportation assets are brought up to, and remain in, good condition.
- Identify potential new financial resources to fund transportation O&M.
- Ensure financial sustainability through alignment of capital and O&M expenditures.
- Develop partnerships through which states and local jurisdictions can share responsibility for some NPS transportation issues, such as maintenance of assets, by developing an effective way to tell the shared asset/use story.
- Develop programmatic agreements at the regional office for common O&M activities so individual units do not have to procure individual contracts or agreements.
- Work with Washington Support Office and partners to identify transportation assets vulnerable to severe weather events.
- Coordinate resilience planning with state and local governmental agencies.
- Ensure that data systems of record are kept current and accurate and use the TCFO calculator or other tools to capture lifecycle costs.

Understanding the Role of NPS Transportation

Transportation plays an important role in the National Park Service related to access and connectivity to parks and positive visitor experiences. In the urban areas of the National Capital Region, most notably the region's parkways, NPS assets have become significant links in the regional transportation network. It is important that the National Park Service understands how the transportation program fits into the operations of the region's transportation system, and equally important that state and local government agencies understand the mission of the National Park Service, the significance of its transportation assets, and their intended uses. Accordingly, it is important that NPS transportation infrastructure be designed and developed to fit within its given natural and/or cultural context.

Recommended Strategies

- Conduct research to better understand the regional and public understanding of the role of the National Park Service in the transportation system, including addressing appropriate signage that would help maintain and highlight the identity of NPS facilities.
- Look for education and outreach opportunities to better inform transportation and community leaders about the NPS mission and the role of transportation, and to improve the coordination of transportation systems and operations between the National Park Service and the National Capital Region partner agencies.
- Provide adequate resources and establish a role designed to aid superintendents with the development of essential partnerships.

View of the Connecticut Avenue NW bridge from Beach Drive

Measuring System Performance

Vulnerability Assessments

Performance Measure — Number of park units that have completed a transportation infrastructure risk assessment

Understanding which assets are vulnerable to the projected effects of climate change is essential to effective long-term asset management. Several efforts, led by NPS regions, the NPS Climate Change Response Program, the NPS Sustainable Operations and Climate Change branch, and partners are moving ahead to address asset resiliency and adaptation.

The Coastal Hazards and Climate Change Asset Vulnerability Assessment Protocol has four primary steps. The four steps and the number of NCR parks that have completed each respective step are listed below:

- Sea level rise assessment
- Exposure analysis and mapping
- Vulnerability analysis
- Adaptation strategies analysis

In some cases, pilot projects have identified transportation assets that may be vulnerable either now or in the near future based on recently experienced severe weather events. The National Park Service will continue to accelerate these efforts to ensure that park unit and regional managers have adequate information to invest transportation funds in ways that account for the effects of climate change.

Baseline

- A sea level rise assessment has been completed for 21 NCR parks as of April 2017.
- Exposure analysis and mapping has been completed for six NCR parks as of April 2017.
- Vulnerability analyses, including structures and roads, have been completed for three NCR parks as of April 2017.
- An adaptation strategies analysis has been completed for zero NCR parks as of April 2017.

Five-Year Target

Prioritize the highest-risk parks; complete risk assessment and adaptation strategy analysis for at least two of the highest-risk park units during the next five years.

Condition of Critical Assets

Performance Measure — Condition of highest-priority transportation assets

Definitions of Priority

The National Capital Region defines "highest-priority transportation assets" as follows:

- Paved Roads: FC 1 and 7
- Bridges: all road bridges
- Transit: all transit assets
- Other asset categories: OB 1

Baseline

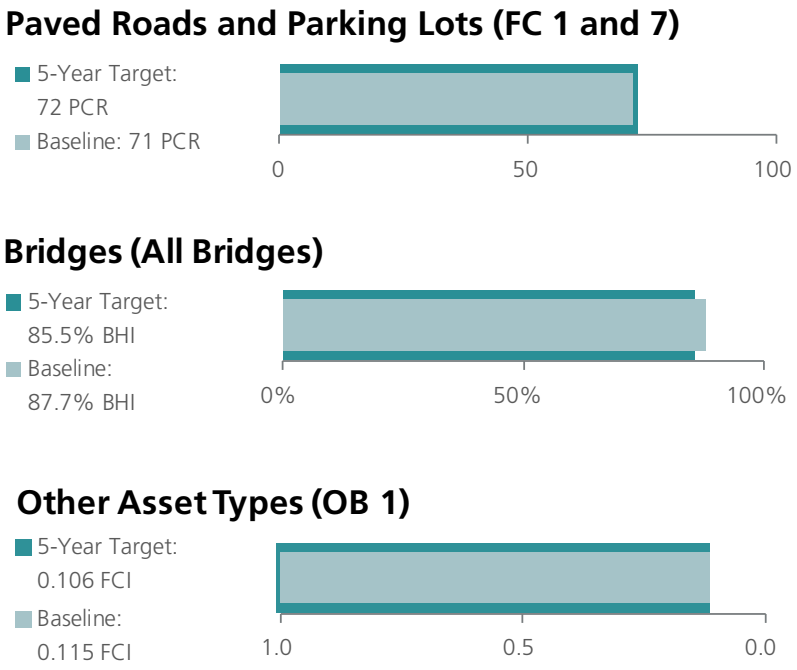
- PCR of 71 for highest-priority paved roads and parking lots
- BHI of 87.7% for highest-priority bridges
- FCI of 0.115 for all other highest-priority transportation assets

Five-Year Target

The National Capital Region aims to achieve the following condition levels during a five-year period:

- PCR of 72 for highest-priority paved roads and parking lots
- BHI of 85.5% for highest-priority bridges
- FCI of 0.106 for all other highest-priority transportation assets

Figure 15. Condition of Critical Assets Performance Measure



Bridge Condition

Performance Measure — Develop bridge performance measures and targets in terms of percent good condition and percent poor condition

These performance measures would be based on the classification of each bridge as good, fair or poor through the application of the minimum of condition rating method to individual condition ratings of deck, superstructure, and substructure elements, the lowest of which would determine the classification of the bridge. These performance measures would align with Moving Ahead for Progress in the 21st Century Act and Fixing America's Surface Transportation Act requirements.

Baseline

Not applicable

Five-Year Target

Identify performance measures.

Asset Disposition

Performance Measure — Reduction in overall management cost of transportation assets

One strategy to relieve some of the DM backlog that the National Capital Region faces is to decommission assets that are no longer in use or lower in priority. This would free up funding to be used for higher-priority needs, and if the asset is completely removed, safety risks associated with that asset would be eliminated. A white paper on "Developing Potential Disposal Strategy" has been developed at the national level and is a resource for developing the strategy.

Baseline

Not applicable

Five-Year Target

Create an inventory of transportation assets within five years that are evaluated for different management strategies such as abandonment, exchange, sale, or leasing.

Beach Drive in Rock Creek Park

Chapter 4. Transportation Finance

National Capital Region Long Range Transportation Plan

Goal Statement

Sustainably manage an appropriate level of funding to accomplish the goals of the Long Range Transportation Plan (LRTP) and pursue other opportunities to expand funding.

Objectives

- Use all available funding in a coordinated manner (including Federal Lands Transportation Program [FLTP], Federal Lands Access Program, and other Title 23 and 54 funds)
- Seek to expand funding through partnerships or reduce costs where necessary
- Strategically use NPS money to fund NCR transportation objectives

Introduction

The National Capital Region is responsible for the allocation of capital, operations, and maintenance funding required to sustain the transportation systems of its park units. Securing the funding for this system is an ongoing, multiyear effort that incorporates input from every level of the National Park Service as well as the Department of the Interior and the Department of Transportation (DOT).

The long-term sustainability of the National Capital Region's transportation system faces a serious financial challenge. Under the current funding forecast, the National Capital Region will not be able to fulfill all capital, operations, or maintenance needs. As a result, the region will face declining asset condition and an inability to modernize or make new investments. Between fiscal year (FY) 2006 and FY 2014, an average $34.3 million per year was invested in NCR transportation assets. In recent years, some major transportation funding programs have leveled, dropped, or been eliminated, and the National Park Service forecasts a modest increase to an annual average of $36.5 million in funding for the period from FY 2016 through FY 2021. Yet, annual transportation portfolio needs are estimated to be $86.8 million, leaving an annual $50.3 million unmet gap. The highest-priority annual needs alone total $65.2 million and exceed total annual forecasted funding by more than $28.7 million (both figures exclude the Arlington Memorial Bridge rehabilitation).

The National Park Service faces several project needs of a scale that will exceed the capacity of historically available funding sources. One such project is the rehabilitation of the Arlington Memorial Bridge, which will be funded at an average annual cost of $4.2 million between FY 2016 and FY 2021. Another example is major rehabilitation of the regional parkway system. Regional parkway system rehabilitation is included in the financial need in this chapter although the Arlington Memorial Bridge rehabilitation is not.

These fiscal realities, while a challenge to the National Park Service, can be met to an extent with an understanding of the actual needs and opportunities. The financial analysis outlined in this chapter, coupled with the transportation investment strategies, supports the National Capital Region to focus spending on high priority assets and align transportation decision making across the park units.

Baseline Conditions and Trends

This chapter provides an overview of the financial conditions that face the National Capital Region of the National Park Service. This section presents transportation investments, needs, and funding gaps from four perspectives—by funding source, by asset category, by asset priority, and by asset lifecycle stage. All historical funding numbers are based on investments between FY 2006 and FY 2014. Historical and forecasted funding amounts are represented in 2015 dollars. Partnership-building strategies to tackle the challenges of financial constraints also are discussed.

Investments by Fund Source

Fund Sources

The National Capital Region receives transportation funding from three main sources, and multiple smaller sources. The main sources are:

- Title 23 of the U.S. Code (Highways)
- Title 54 Non-Fee
- Title 16 and 54 Fee

The largest source of the historical funding (approximately 71%) has been authorized under Title 23 of the U.S. Code (Highways). The next-largest share is authorized under Titles 16 and Title 54 (laws specifically relating to the National Park Service and Department of the Interior). The Title 16 and 54 funding is separated by "non-fee" and "fee" programs. "Non-fee" monies come from congressional appropriations, and "fee" dollars come from visitor and concession revenues at the park units. In addition to these three main sources, the National Capital Region receives funding from programs administered by the Federal Transit Administration (FTA), reimbursable agreements, and donations.

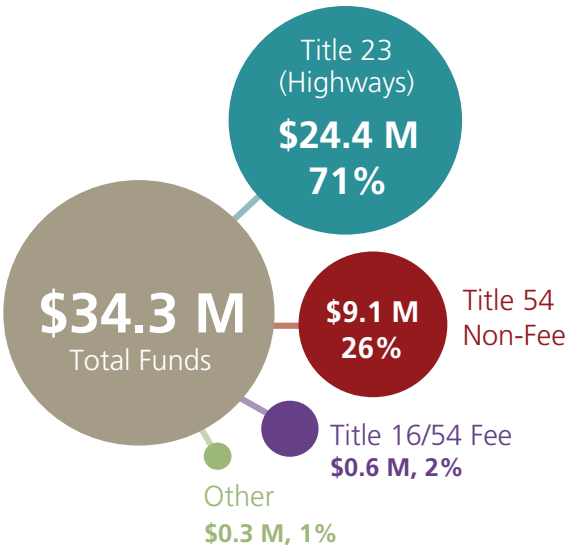
Historical and Forecast Investment

The National Capital Region funding together averaged $34.3 million per year from FY 2006 through FY 2014 (Figure 16) across all programs combined. The National Capital Region's primary three funding sources can be further broken down into 18 individual programs, shown in Table 12.

The majority of Title 23 funding came from the largest individual program, the Federal Highway Administration (FHWA) FLTP, at an average level of $19 million per year (55% of all regional transportation funding). The next-largest individual program share is the Title 54 Operational Park Base ($5.6 million annually, or 16% of all regional transportation funding). A recent challenge has been the discontinuation of The National Scenic Byways Program, the Public Lands Highway Discretionary (PLH-D) Program, and the FTA Transit In the Park (TRIP) Program—all of which provided the National Capital Region with supplemental funding. Earmarks have been discontinued as well, eliminating a notable source of transportation funding for the region. Earmarks accounted for about 12% of the historical funding in the region.

To promote transparency and improve decision-making processes, the National Capital Region created an NCR-FLTP Committee to evaluate project proposals and make funding recommendations to the regional director. As part of the evaluation process, the NCR-FLTP Committee uses a data-driven project prioritization tool that identifies transportation investments that advance NPS mission and regional priorities, reflect the most critical transportation needs in the region, and are consistent with the transportation asset management best practices.

Figure 16. Average Annual Historical Investment by Funding Sources (FY 2006–2014)



Between FY 2016 and FY 2021, the National Capital Region forecasts annual transportation resources of $36.5 million, an increase of $2.2 million (Figure 17). This forecast is based on past funding availability and does not reflect any funding changes as a result of the Fixing America's Surfact Transportation Act transportation legislation or other NPS FY16 increased funding levels. It also does not include the $4.2 million per year of FLTP funding for the Arlington Memorial Bridge (AMB) rehabilitation.

Table 12. Average Annual Transportation Investment by Fund Source (FY 2006–2014)

Note: Figures are in millions of dollars (2015).

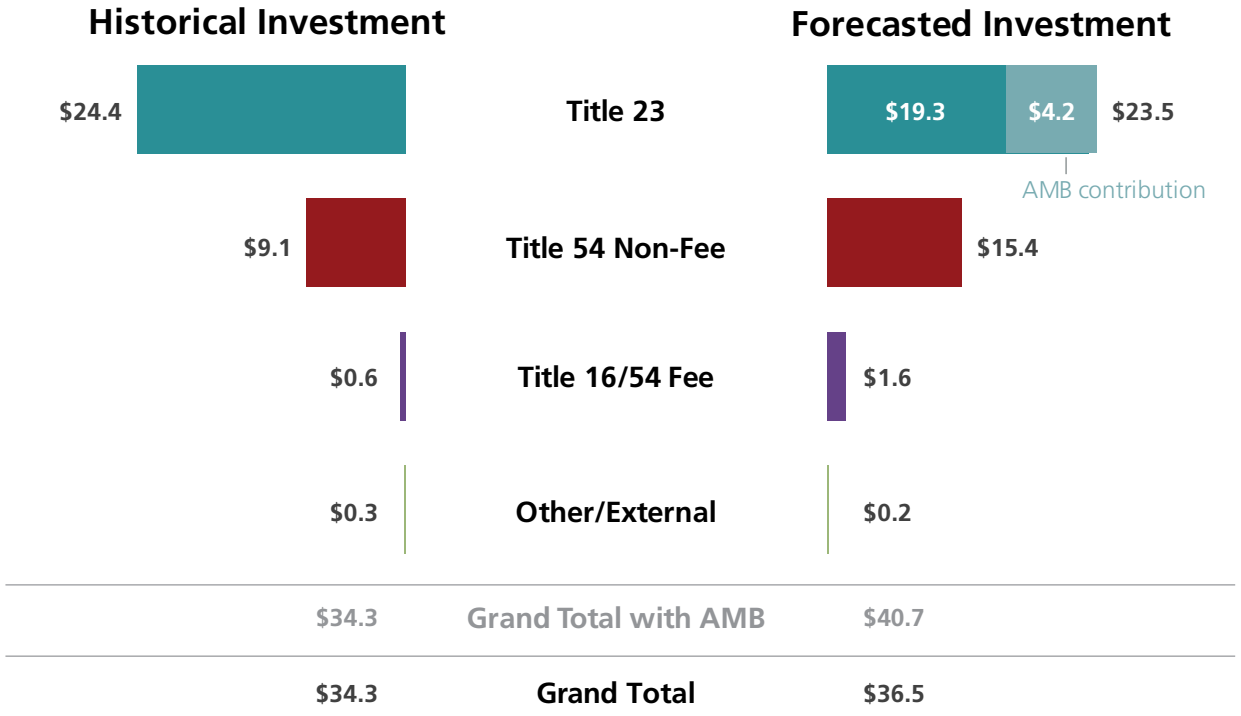
Funding Source/Program	Transportation Primary Intent of Funds?	Project Programming Responsibility	Paved Roads and Bridge Network	Other Transportation Assets	Grand Total	% of Grand Total
Title 54 Non-Fee			$6.1	$3.0	$9.1	26%
Operational Base		Park Unit	$4.8	$0.8	$5.6	16%
Cyclic Maintenance		Regional/ National	$0.6	$0.7	$1.3	4%
Repair/Rehab		Regional/ National	$0.3	$0.6	$0.9	3%
Line Item Construction		Regional/ National	$0.1	$0.6	$0.7	2%
Other NPS Programs		Regional/ National	$0.1	$0.4	$0.5	2%
Emergency Storm and Flood Damage		Regional/ National	$0.1	<$0.1	$0.1	0%
Title 16/54 Fee			$0.2	$0.4	$0.6	2%
Recreation Fee		Park Unit	$0.2	$0.4	$0.6	2%
Transportation Fee	Yes	Park Unit	–	<$0.1	<$0.1	0%
Concessions Franchise Fees		Park Unit	<$0.1	<$0.1	<$0.1	0%
Title 23			$20.7	$3.7	$24.4	71%
FLTP	Yes	Regional/ National	$17.5	$1.6	$19.0	55%
Earmarks	Yes	Not Applicable	$2.0	$0.2	$2.2	6%
Public Lands Highway – Discretionary	Yes	Regional/ National	$1.2	$0.5	$1.7	5%
Other FHWA Programs	Yes	Regional/ National	<$0.1	$0.6	$0.7	2%
Scenic Byways	Yes	Regional/ National	$0.1	$0.0	$0.1	0%
Transportation Alternatives	Yes	Park Unit	–	$0.7	$0.7	2%
Other/External			$0.1	$0.2	$0.3	1%
FTA TRIP/ATPPL	Yes	Park Unit	–	<$0.1	<$0.1	0%
Reimbursable Agreements		Park Unit	$0.1	$0.1	$0.2	1%
Donations		Park Unit	<$0.1	<$0.1	<$0.1	0%
Grand Total			**$27.1**	**$7.3**	**$34.3**	**100%**

The Title 23 forecast presented in this plan is based on the assumption that FLTP would remain flat at Moving Ahead for Progress in the 21st Century Act funding levels, and discretionary programs eliminated under Moving Ahead for Progress in the 21st Century Act would continue to be unavailable.

The Title 54 "Non-Fee" funds are projected to increase by $6.3 million, which is primarily due to increases in Line Item Construction project funding, and the "Fee" funds increase due to the expectation of increased revenue from recreation fees.

Figure 17. Comparison of Annual Average Investments (FY 2006–2014) and Annual Forecasted Resources (FY 2016–2021)

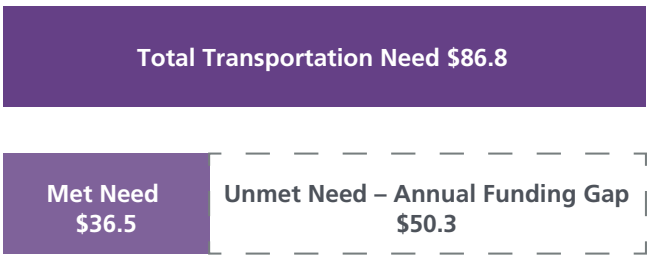
Note: Figures are in millions of dollars (2015).



The National Capital Region estimates its total annual transportation funding need to be $86.8 million annually from FY 2016 to 2021. This estimate is based on asset condition models and management system records for paved roads and bridges as well as needs documented in NPS project and management systems of record. Based on forecasted funding of $36.5 million, the resulting annual gap is $50.3 million (Figure 18).

Figure 18. Annual Estimated NCR Transportation Funding Gap

Note: Figures are in millions of dollars (2015). Parkway reconstruction is included, but Arlington Memorial Bridge rehabilitation is not.



Investments by Asset Category

The National Capital Region operates and maintains a diverse set of transportation assets and services. The National Capital Region has historically invested the majority of its funding in paved roads at $20.8 million (61%). Road bridges received the next-largest investment at $6.3 million (18%), and trails received $3.7 million (11%). The remaining 10% of historical investments were in parking, waterways, transit, unpaved roads, road tunnels, buildings, and other (Figure 19).

Between FY 2006 and FY 2014, the National Capital Region invested an annual average of $27.1 million in the paved road and bridge network and an annual average of $7.3 million in all other transportation assets (Figure 20). Title 23 contributed $20.7 million for road and bridge investments, or 76% of the total investment in these assets, while contributing $3.8 million, or 53%, of the total for all other asset categories.

Figure 19. Average Annual Historical Transportation Investment by Asset Category (FY 2006–2014)

Note: Figures are in millions of dollars (2015).

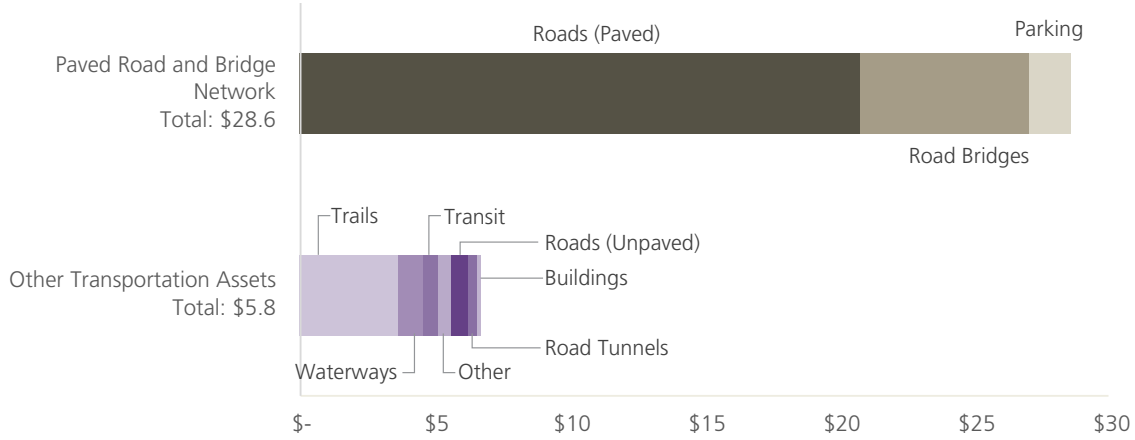
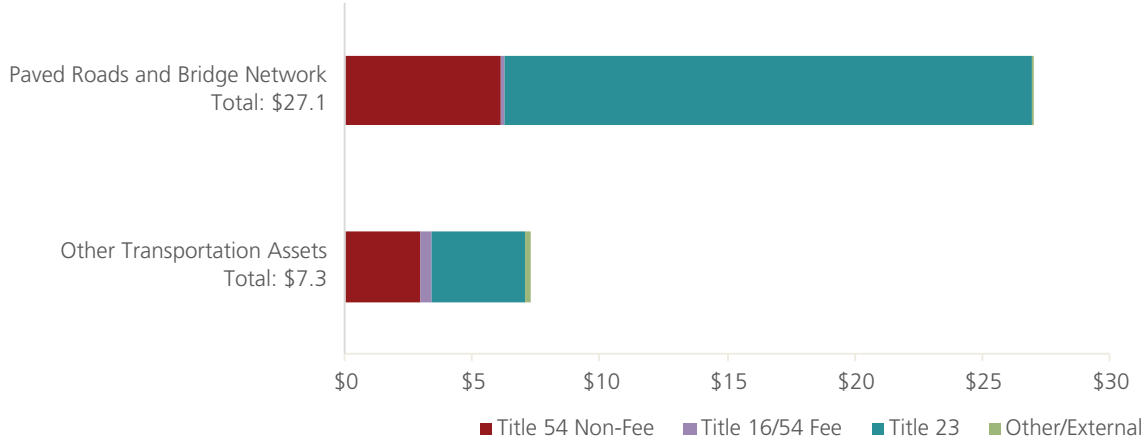


Figure 20. Average Annual Investment by Funding Authorization (FY 2006–2014)

Note: Figures are in millions of dollars (2015).



If the National Capital Region continues to fund its transportation assets in a manner similar to historical levels, there will be an estimated funding gap of $50.3 million annually between FY 2016 and FY 2021. Paved road and bridges require $71.3 million annually during this timeframe, but could be expected to be funded at $24.1 million. The remainder of the assets would require $15.6 million, but the outlook shows their potential funding at $12.5 million annually (Figure 21).

Investments by Asset Priority

The National Capital Region defines asset priority categories differently based on the kind of transportation asset. Table 13 defines the asset priority definitions for "highest-priority," "high-priority," and "other priorities."

Needs for highest-priority assets account for $65 million per year and the high-priority assets are $11.5 million per year (Figure 22). Even if all forecasted funding were applied to just these two categories of assets, the National Capital Region would still be $44 million per year short of meeting the needs of these assets.

Figure 21. Average Annual Needs and Gaps by Asset Category Based on Historical Investment Patterns (FY 2016–2021)

Note: Figures are in millions dollars (2015).

Asset Category	Total Needs	Met Needs	Unmet Needs	% of Needs Met
Paved Road and Bridge Network Needs	$ 71.3	$ 24.1	$ 47.2	34%
Other Transportation Assets Needs	$ 15.6	$ 12.5	$ 3.1	80%

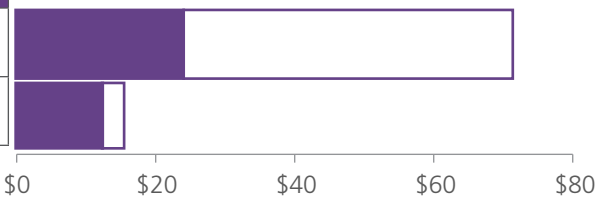


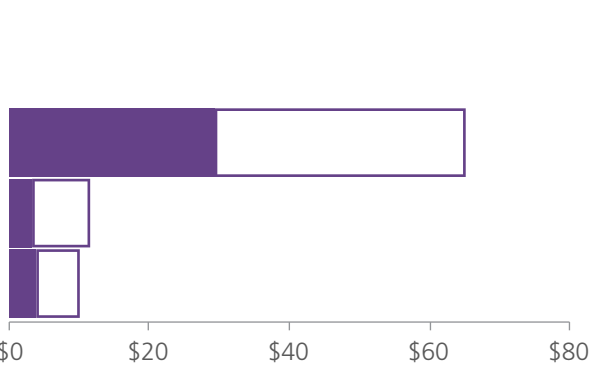
Table 13. Asset Priority Definitions by Asset Category

Asset Categories	Highest-priority	High Priority	Other Priorities
Paved Roads and Parking	FC 1 and 7		FC 2, 3, 4, 5, 6, and 8
Bridges	All		
Transit	All		
All Other	OB 1	OB 2	OB 3,4,5

Figure 22. Average Annual Funding Needs and Gaps by Project Priority (FY 2016–2021)

Note: Figures are in millions of dollars (2015). Parkway reconstruction is included, but AMB is not

Asset Priority	Total Needs	Met Needs	Unmet Needs	% of Needs Met
Highest-priority	$65.2	$ 29.4	$ 35.8	45%
High-Priority	$ 11.5	$ 3.3	$ 8.2	29%
Other Priority	$ 10.2	$ 3.9	$ 6.3	27%



NPS Transportation Lifecycle Work Types

Planning and Administration (PL)

Activities to identify challenges, needs, and alternative solutions prior to implementing a solution

Capital Investment (CI)

Construction of new assets as well as major reconstruction projects that incorporate new functions into existing assets

Facility Operations (FO)

Activities that ensure the day-to-day operation of transportation systems (e.g., plowing, transit operations, mowing)

Preventative Maintenance (PM)

Maintenance tasks performed on an annual or more-frequent basis (e.g., cleaning culverts, inspections, vegetation control)

Recurring Maintenance (RM)

Less-frequent maintenance tasks performed on a cycle of 1 to 10 years (e.g., chip seals, mill and overlays, restriping)

Component Renewal (CR)

Infrastructure replacement projects that do not expand the asset portfolio or liabilities for operations and maintenance activities

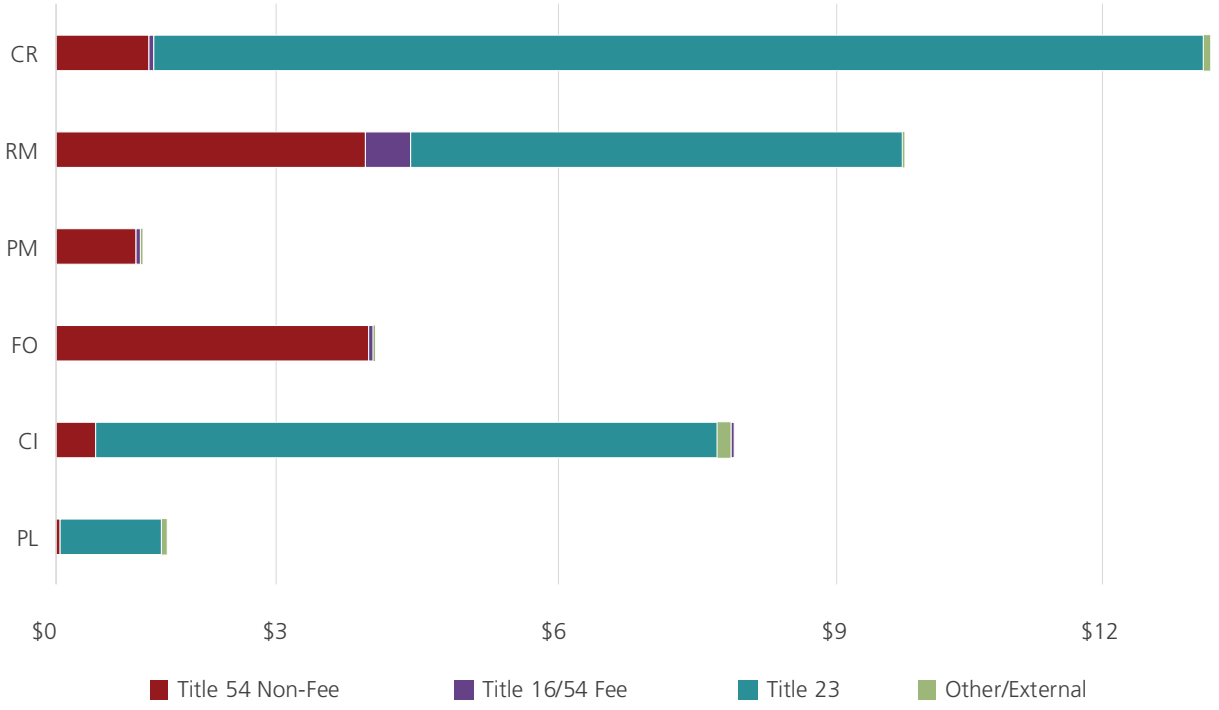
Investments by Asset Lifecycle

Asset lifecycle stages play an important role in transportation investment decisions. Between FY 2006 and FY 2014, the National Capital Region primarily used Title 23 funds for CR, RM, CI, and PL projects, while most PM and FO activities were funded almost exclusively with Title 54 "Non-Fee" funds (Figure 23).

The National Capital Region has historically invested the majority of funding in component renewal ($12.4 million), followed by recurring maintenance ($9.2 million), and capital investments ($7.2 million) (Figure 23 and Table 14). Investments to improve asset condition have accounted for the biggest share of total transportation spending (approximately 63%, not including capital investment). Operations and maintenance projects, on the other hand, received about 13% of the total investment. The majority of the investments for both condition improvements and non-condition investment were funded through Title 23 funding sources, although the contributions from Title 54 non-fee programs are also important as these sources support all FO, PM, and a significant share of RM activities.

Figure 23. Average Annual Investments by Asset Lifecycle Stage and Funding Source (FY 2006– 2014)

Note: Figures are in millions of dollars (2015).



Harpers Ferry National Historic Park

Table 14. Average Annual Historical Transportation Investment by Lifecycle Stages and Funding Source (FY 2006–2014)

Note: Figures are in millions of dollars (2015).

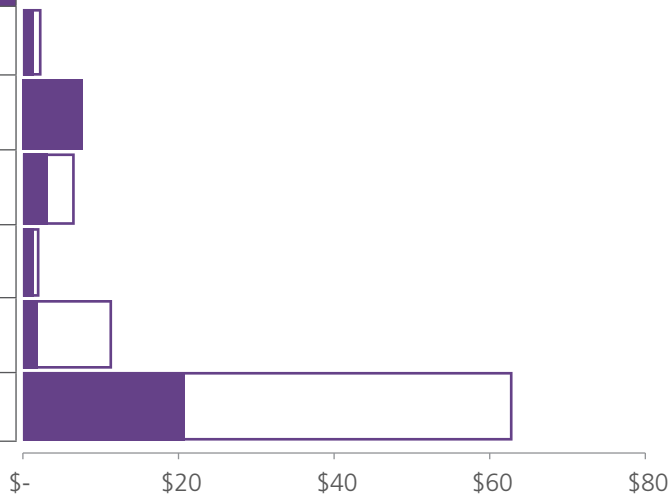
Funding Source/ Program	PL	CI	FO	PM	RM	CR	Grand Total
Title 16/54 Fee	$0.1	$0.4	$3.4	$0.9	$3.8	$1.1	$9.7
Title 54 Non-Fee	$0.1	$0.4	$3.4	$0.9	$3.3	$1.0	$9.1
Operational Base			$3.20	$0.90	$1.30	$0.20	$5.60
Cyclic Maintenance			<$0.1		$0.90	$0.40	$1.30
Repair/Rehab		<$0.1	$0.10		$0.60	$0.10	$0.90
Line Item Construction	<$0.1	$0.30	<$0.1		$0.40	<$0.1	$0.70
Other NPS Programs	<$0.1	$0.10	$0.10	<$0.1	$0.10	$0.20	$0.50
Emergency Storm & Flood Damage			<$0.1	<$0.1	<$0.1	$0.10	$0.10
Title 16/54 Fee		<$0.1	$0.10	$0.10	$0.50	$0.10	$0.60
Recreation Fee		<$0.1	<$0.1	$0.10	$0.50	$0.10	$0.60
Transportation Fee			<$0.1				<$0.1
Concessions Franchise Fees		<$0.1	<$0.1	<$0.1	<$0.1		<$0.1
Title 23	$1.10	$6.70			$5.30	$11.30	$24.40
FLTP	$0.50	$3.40			$3.90	$11.30	$19.00
Earmarks	$0.50	$1.70					$2.20
Public Lands Highway - Discretionary	$0.10	$0.20			$1.30		$1.70
Transportation Alternatives		$0.60			$0.10	<$0.1	$0.70
Other FHWA Programs	<$0.1	$0.60					$0.70
Scenic Byways	<$0.1	$0.10				<$0.1	$0.10
Other/External	<$0.1	$0.10	<$0.1	<$0.1	<$0.1	$0.10	$0.30
Reimbursable Agreements		$0.10				$0.10	$0.20
FTA TRIP/ATPPL	<$0.1						<$0.1
Donations		<$0.1	<$0.1	<$0.1	<$0.1		<$0.1
Grand Total	**$1.20**	**$7.20**	**$3.40**	**$0.90**	**$9.20**	**$12.40**	**$34.30**

Forecasts show that if future investments were made following historical spending patterns, all the asset lifecycle stages would be inadequately funded except for capital investments (Figure 24). Projects for condition improvement (including RM and CR), which account for the largest percentage of the future needs, would have had the largest funding gap. Approximately 18.4% of the related improvement projects could have been covered by the forecasted funding. The funding gap for condition maintenance (including FO and PM) would have been estimated at 70%. PA work, which is part of non-condition-related activities, would have had more than 50% of its needs covered, though this represents a very small share of the total need.

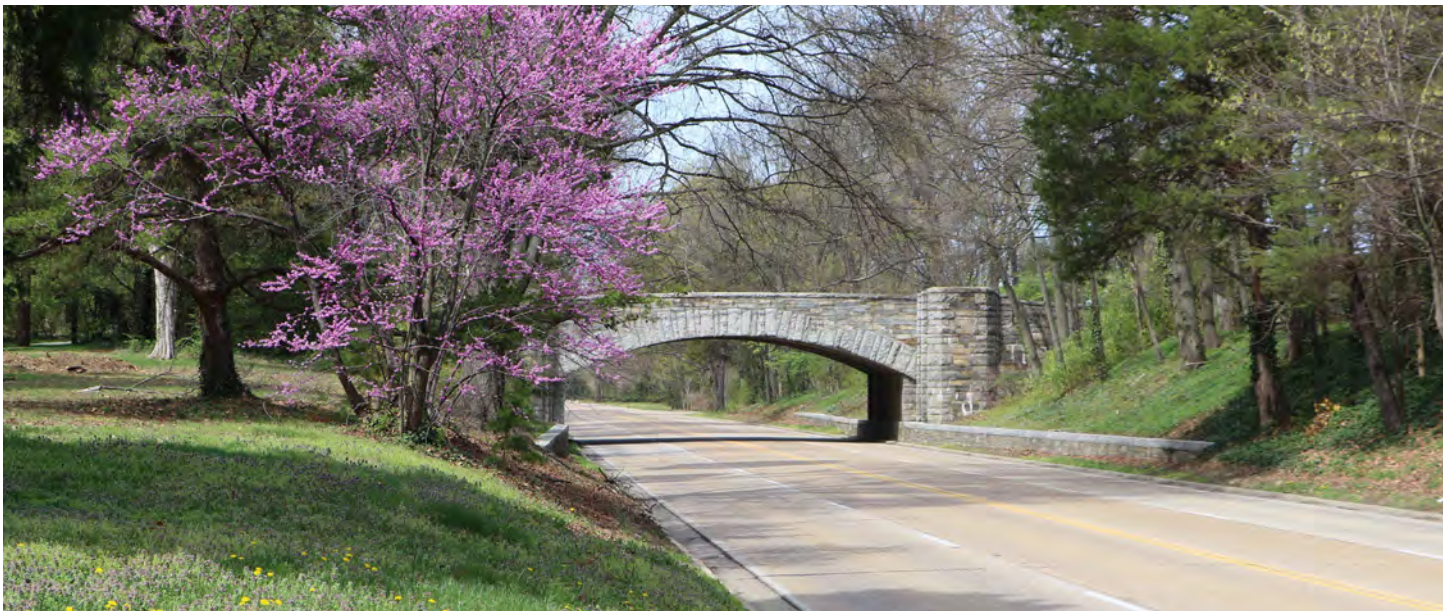
Figure 24. Average Annual Funding Needs and Gaps by Lifecycle Stage Category (FY 2016–2021)

Note: Figures are in millions of dollars (2015). Parkway reconstruction is included, but Arlington Memorial Bridge rehabilitation is not.

Lifecycle Stage	Total Needs	Met Needs	Unmet Needs	% of Needs Met
Planning and Administration	$2.4	$1.3	$1.1	54%
Capital Investment	$0.9	$7.9	$ -	100%
Facility Operations	$6.7	$3.2	$3.5	48%
Preventative Maintenance	$2.3	$1.4	$0.9	61%
Recurring Maintenance	$11.6	$2.0	$9.6	17%
Component Renewal	$63.0	$20.8	$42.2	33%



George Washington Memorial Parkway



Large-Scale Projects

Funding is needed for large-scale projects that are beyond the capacity of funding sources that have historically been available for NPS transportation.

Arlington Memorial Bridge Repair and Reconstruction

Estimated Project Cost: $227 million

Arlington Memorial Bridge is an iconic bridge that provides a critical link between the National Mall and Memorial Parks in Washington, DC, and the George Washington Memorial Parkway and Arlington National Cemetery in the Commonwealth of Virginia. It is one of five highway bridges between the District of Columbia and Virginia across the Potomac River, and carries approximately 51,400 vehicles, 1,100 bicycles, and 1,200 pedestrians per day[1]. The repair cost is estimated to be $227 million (2017 dollars). The reconstruction is planned to be funded by a combination of federal grants, FLTP program funds, and other sources. The currently planned NCR FLTP contribution to the reconstruction is a total of $20.9 million (an average of $4.2 million per year) between FY 2016 and FY 2021. This need is not captured in the $86.8M total forecast.

Arlington Memorial Bridge

Parkways Repair and Reconstruction

Estimated Project Cost: $19.1 million annually for as long as 20 years

The regional parkway system is an important NPS cultural asset that serves a function in the regional transportation roadway and commuting network. The five major parkways are:

- Baltimore-Washington Parkway – managed by the National Park Service from the US-50/MD-201 interchange near the Washington, DC, border to the interchange with MD-175 near Fort Meade in Howard County, MD
- Suitland Parkway – managed by the National Park Service from Pennsylvania Avenue to I-295 near the Anacostia River
- George Washington Memorial Parkway – managed by the National Park Service from Mount Vernon to the Capital Beltway in Virginia (except for a segment in Alexandria)
- Rock Creek and Potomac Parkway – managed by the National Park Service from the Lincoln Memorial to Connecticut Avenue NW
- Clara Barton Parkway – managed by the National Park Service from the MacArthur Boulevard Exit to Chain Bridge

Together, these parkways carry millions of daily vehicle miles for recreational and commuting purposes and experience significant congestion. These parkways are due for major rehabilitation activities, which could require approximately $19.1 million annually for as long as 20 years. This need is included in the $86.8M total forecast need.

Rock Creek and Potomac Parkway

1 Vehicle: District Department of Transportation Citywide Traffic Volume Map, 2014. https://ddot.dc.gov/sites/default/files/dc/sites/ddot/publication/attachments/CityWide2014.pdf; Pedestrian and bicycle: District Department of Transportation, August 2015.

Partnerships

As discussed, the National Capital Region is facing an annual funding gap of $50.3 million from FY 2016 through FY 2021. An opportunity to address these funding challenges is to expand partnerships with local, state, and federal entities as well as private-sector organizations. The National Capital Region has limited authority for innovative financing options (e.g., tolling, bonding), and generally is not eligible to be the recipient of federal and state grants that other state transportation agencies have access to. Strategic partnerships could help the National Capital Region enhance and expand multimodal transportation systems, and spread knowledge regarding the National Capital Region's mission and role in transportation planning and management.

The key to effective partnerships is to assess how transportation needs align across partners and identify specific opportunities for addressing common goals. This way, the external entities will be more willing to commit to the partnerships, instead of treating the National Capital Region as a competitor in securing funding or sharing resources. Table 15 identifies partnerships the National Capital Region could build upon.

For additional information on ideas for the National Capital Region to partner with local entities, the National Park Service has put together a webinar and fact sheet[2] on the topic.

Table 15. Existing and Potential Partners

Partners	Partnership Opportunities
Departments of Transportation (e.g., District DOT, Virginia DOT, Maryland DOT)	■ Coordinate on LRTP and other planning processes to identify opportunities for connections and sustainable transportation solutions. ■ Share information, best practices, and data.
Metropolitan Planning Organizations (e.g., National Capital Region Transportation Planning Board, Baltimore Regional Transportation Board, Hagerstown/ Eastern Panhandle Metropolitan Planning Organization)	■ Coordinate on LRTP and other planning processes and identify opportunities for connections and sustainable transportation solutions. ■ Share information, best practices, and data.
Regional/Local Transit Agencies or Providers (e.g., WMATA, MARC, Capital Bikeshare, DC Circulator)	■ Coordinate on transit options to the park units that serve residents and visitors alike. ■ Share information, best practices, and data.
Non-Profit Organizations (e.g., park "friend" groups)	■ Shared mission to preserve, protect, and promote the parks; non-profits could help administer and manage private sector donations.
Local Businesses/Private Transport Service Operators	■ Increased attraction as a result of better transportation facilities at the parks could help promote local businesses and economic development in general; they have incentives to provide donations or services (covering costs of capital investment and/or operations).
Multiagency Partnerships	■ Coordinate with entities such as the Coordinated Highways Action Response Team to expand multimodal and multi-topic conversations related to transportation.
Private Entities	■ Coordinate on new technologies to enhance mobility, safety, and funding for National Capital Region.

2 https://www.nps.gov/transportation/new_NPS_funding_opportunities.html

Regional Issues and Opportunities

Funding

Funding is a primary challenge that the National Capital Region, and the National Park Service overall, faces on a year-to-year basis. Projected future funding levels are insufficient to maintain all transportation assets in a state of good condition, and the annual nature of the authorization of NPS funding makes it difficult to plan for future needs. The National Park Service has limited authority to pursue innovative finance options for transportation infrastructure, and is not an eligible recipient for many federal and state grant programs. Where the National Park Service is eligible for state grants, it often must identify a local sponsor to apply on their behalf, who may see an NPS project as competing with their own grant applications.

Recommended Strategies

- Identify opportunities to utilize shared-cost services and streamline contracting mechanisms such as supporting the use of indefinite delivery/indefinite quantity contracts.
- Develop and disseminate guidance on best practices for incorporating nonmotorized improvements into repaving cycles or major roadway rehabilitation to save costs.
- Identify new or creative opportunities to fund transportation projects.

Partnerships

A recurring opportunity to address many of the transportation challenges faced by the region is expanded partnerships with local, state, and federal entities as well as private-sector organizations. There is a need for better partner outreach materials and instructional or educational materials for individual parks to use to reach out to partners. Strategies to address this issue are outlined below.

Recommended Strategy

- Build and strengthen collaborative partnerships to identify cost-sharing resources for transportation projects of all modes.

Measuring System Performance

Funding

Performance Measure — Percentage of transportation funds invested in highest-priority transportation assets

This performance measure extends the NCR focus beyond DM to all investments of highest-priority transportation assets and services.

Baseline

80% of transportation funds invested in highest-priority assets.

Five-Year Target

88% of transportation funds invested in highest-priority assets.

Figure 25. Percentage of Transportation Funds Invested in Highest-Priority Transportation Assets

Performance Measure — Percentage of park units that meet PM targets for highest-priority transportation assets

This performance measure is directly related to the Capital Investment Strategy requirement that park units complete at least 55% of planned PM activities on OB 1 assets.

Baseline

Not available

Five-Year Target

100% of parks within five years.

Chesapeake and Ohio Canal National Historical Park

Antietam National Battlefield

Chapter 5. Resource Protection

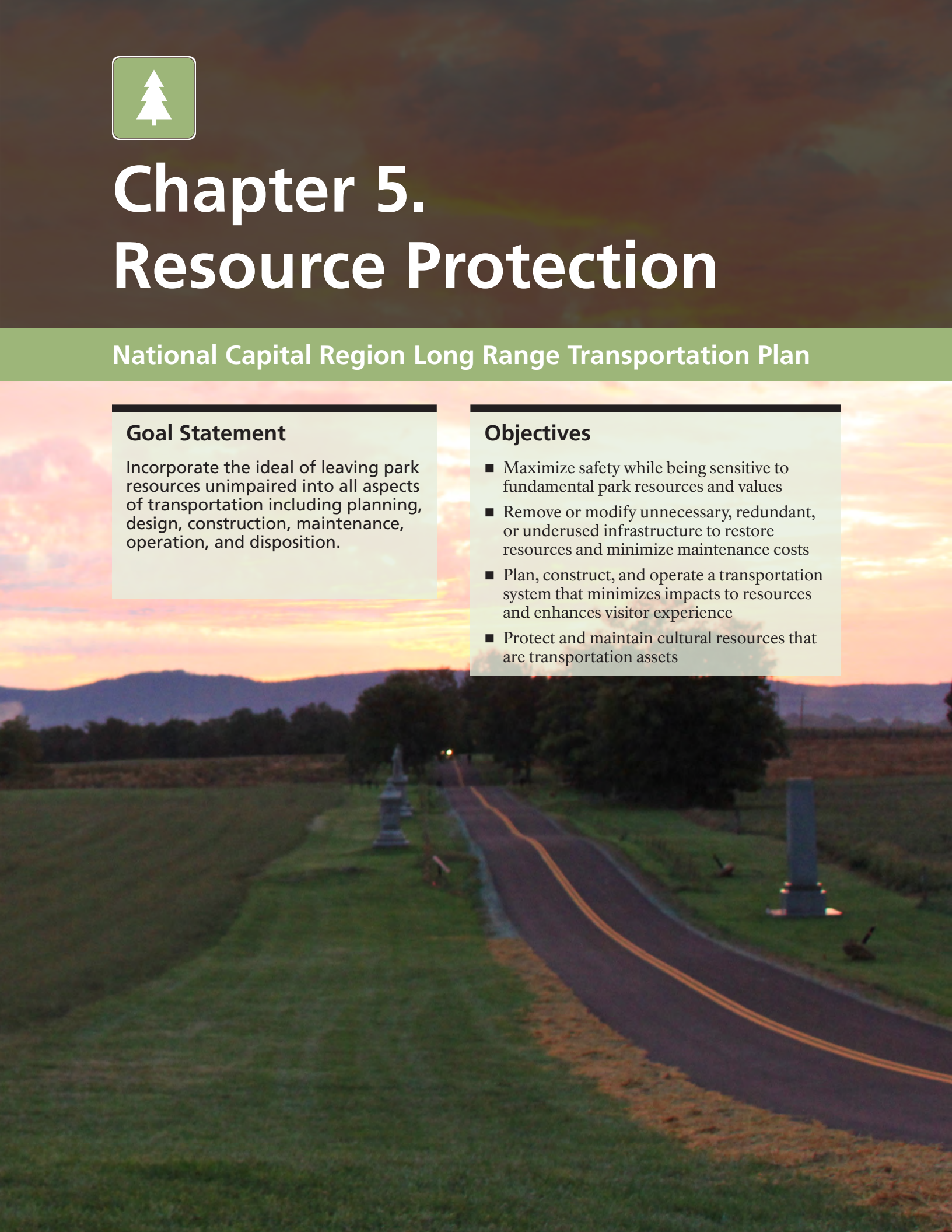
National Capital Region Long Range Transportation Plan

Goal Statement

Incorporate the ideal of leaving park resources unimpaired into all aspects of transportation including planning, design, construction, maintenance, operation, and disposition.

Objectives

- Maximize safety while being sensitive to fundamental park resources and values
- Remove or modify unnecessary, redundant, or underused infrastructure to restore resources and minimize maintenance costs
- Plan, construct, and operate a transportation system that minimizes impacts to resources and enhances visitor experience
- Protect and maintain cultural resources that are transportation assets



Introduction

The National Park Service coordinates the planning and implementation of transportation systems within its park boundaries in a context-sensitive manner. This coordination helps ensure that transportation systems fit within the parks' physical settings while helping to preserve and protect natural and cultural resources, reduce congestion and pollution, and maintain visitor safety and mobility.

The National Park Service also strives to strike a balance between maximizing the serviceability of parks for visitors and minimizing the impact on the parks' natural and cultural surroundings. This balance is particularly challenging in the National Park Service's National Capital Region, where many components of the NPS transportation system facilitate travel for both park visitors and regional commuters, resulting in increased effects on the quality and integrity of sensitive natural and historic resources. The degrading effect that significant volumes of pass-through traffic can have on historic and natural resources as well as ecosystems in the region is a critical area of concern.

External environmental threats also pose additional risks relating to resource protection of NPS assets. The National Park Service is working on strategies to mitigate energy consumption and greenhouse gas (GHG) emissions within its transportation system and to adapt to climate stress on its transportation assets by enhancing their resiliency. Other concerns, such as degradation of air and water quality, hazard mitigation, and wildlife-vehicle collisions, are being addressed through an integrated approach to natural resource and infrastructure management issues.

The National Park Service is committed to environmental excellence and historic preservation and will continue to identify best management practices to address any negative impacts on cultural or natural resources. This chapter discusses the known challenges as well as opportunities to address resource protection in the National Capital Region.

Baseline Conditions and Trends

Culturally Significant Assets

Transportation assets in the National Capital Region include cultural resources such as national parkways, scenic byways, and historic trails, bridges, tunnels, canals, and landmarks. These assets are typically considered culturally significant given their historic role, structural significance, or designation as such. The National Park Service strives to balance preserving its cultural significance while maintaining transportation function. The National Park Service maintains inventories of these culturally significant assets to track facility condition and maintenance status, and is required to maintain historic assets in a better condition than other assets.

Table 16 presents a summary inventory of the transportation assets by category and historic status in comparison with overall assets. Historic assets are identified per National Register of Historic Places criteria including: National Historic Landmark, National Register Listed, or National Register Eligible assets. Historic transportation assets make up (by count of assets) approximately 25% of NCR transportation assets based on Facility Management Software System (FMSS) year-end data.

Table 16. Historic Transportation Assets, by Asset Category

Source: 2015 FMSS year-end data

Transportation Asset Category	Federal Real Property Historic Status	Total NPS Inventory	Percentage of NPS Inventory
Roads	89	536	17%
Parking Areas	7	439	2%
Road Bridges and Tunnels	74	161	46%
Trails	187	235	80%
Trail Bridges	25	152	16%
Trail Tunnels	1	2	50%
Constructed Waterways	9	9	100%
Marina/Waterfront	0	18	0%
Railroad Systems	0	12	0%
Transit Systems	0	3	0%
Total	392	1,567	25%

While only about one quarter of the total transportation assets by count, historic assets represent approximately 60% of the total current replacement value (CRV) of the NCR transportation assets. Large proportions of the total CRV by asset type is tied into a small subset of assets, particularly for paved roads and bridges. For example, the Arlington Memorial Bridge and George Washington Memorial Parkway (both historic assets) represent a significant portion of this value.

Condition of Culturally Significant Transportation Assets

The preservation of culturally significant assets is at the core of the NPS mission, and this holds true for transportation assets as well. Due to ongoing efforts to better capture the condition of these assets in servicewide systems of records, baseline condition data are not available for all asset categories.

The National Long Range Transportation Plan established a target of developing a system to track and forecast condition of culturally significant transportation assets. Efforts to compile a comprehensive baseline are underway (30% complete as of July 2017) and will be complete before the first update of the National Long Range Transportation Plan.

Based on available data, the National Capital Region estimates that culturally significant roads and all other assets are in slightly better condition than all the NCR paved roads as measured by pavement condition rating and facility condition index (Figure 26). Both culturally significant Other Transportation Assets and those not classified as culturally significant are in good condition on average (Figure 27). Data is not available for bridges. For additional information, see asset management chapter and the discussion of asset condition.

Figure 26. Condition of Culturally Significant Paved Roads

Source: 2015 FMSS year-end data (Culturally Significant Assets); FHWA-EFLHD, Road Inventory Program Database, accessed October 20, 2016 (PCR). Does not included associated parking areas.

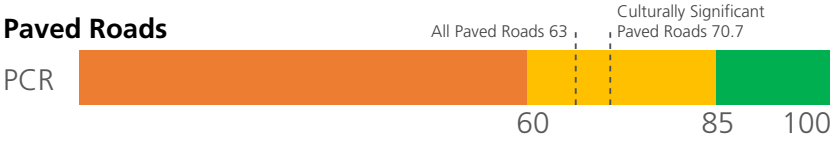
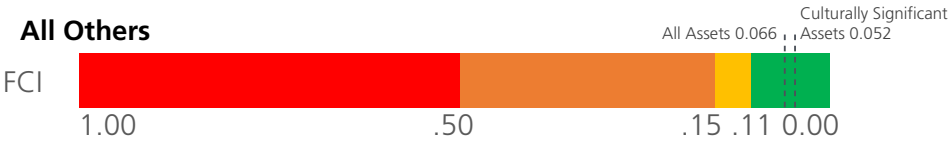


Figure 27. Condition of Culturally Significant All Other Assets

Source: 2015 FMSS year-end data



Baltimore-Washington Memorial Parkway

Resiliency

GHG Emissions and Mitigation

One of the ways the National Park Service is helping to address climate change is through strategies to reduce its carbon footprint in the parks and surrounding areas. The National Park Service developed its Climate Change Response Strategy[1] and Climate Change Action Plan[2], which address climate change mitigation goal setting, and outline actions and strategies to reach the objectives.

The National Park Service developed the Green Parks Plan (developed in 2012 and updated in 2016) to address climate change mitigation and GHG reductions specifically, which requires creating GHG inventories and listing the GHG mitigation activities that the parks are undertaking to meet the goals. The Climate Friendly Parks (CFP) program supports the Green Parks Plan with tools and resources to address the potential effects of climate change within NPS boundaries and in the surrounding areas. It includes:

- Measurement of park-based GHG emissions
- Stakeholder education and demonstration of action to address climate change
- Supporting development of actions and strategies to reduce GHG emissions

Parks become official CFP members upon the completion of a structured program that requires attainment of the following four milestones:[3]

- Submitting a CFP application expressing interest in the program and designating a park CFP team
- Completing a GHG inventory to develop a baseline emissions inventory for park operations
- Conducting training and outreach sessions to stakeholders, educating them on potential climate change impacts and discussing strategies
- Completing a CFP action plan outlining response and outreach actions to educate stakeholders

The CFP program has more than 120 member parks across the country, which includes 10 parks in the National Capital Region. They are:

- Antietam National Battlefield
- Catoctin Mountain Park
- George Washington Memorial Parkway
- Harpers Ferry National Historical Park
- Manassas National Battlefield Park
- Monocacy National Battlefield
- National Capital Parks – East
- National Mall and Memorial Parks
- Prince William Forest Park
- Rock Creek Park

1 The NPS Climate Change Response Strategy, https://www.nps.gov/orgs/ccrp/upload/NPS_CCRS.pdf

2 The NPS Climate Change Action Plan, https://www.nps.gov/orgs/ccrp/upload/NPS_CCActionPlan.pdf

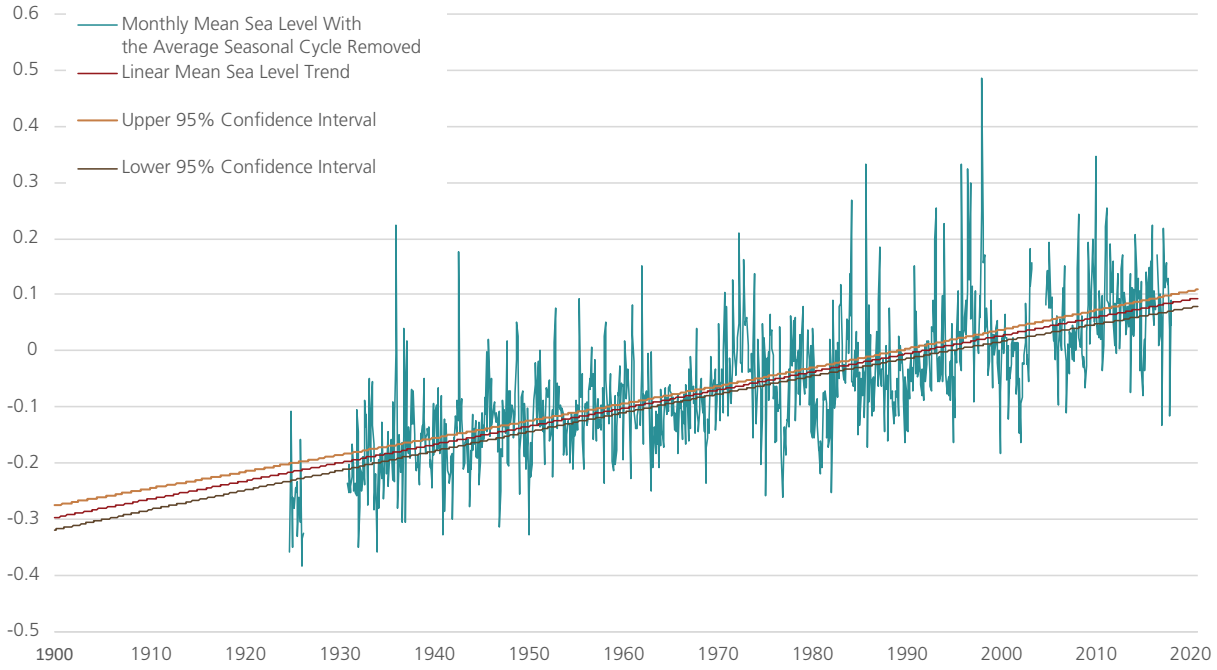
3 Climate Friendly Parks Program, Becoming a CFP Member Park, https://www.nps.gov/subjects/climatechange/cfpprogram.htm

Sea Level Rise

Rising sea level is a significant and challenging byproduct of climate change that could impact multiple transportation assets within the National Capital Region. Historical tide gauge data in the Washington, DC, area indicate mean sea level trend of 0.127 inches/year or 3.23 millimeters/year. This is based on monthly mean sea level data from 1924–2016 (Figure 28). United States Army Corps of Engineers projections[4] of sea level rise for Washington, DC, range between 0.38 and 0.91 feet by the year 2030, and 0.58 to 1.83 feet by 2050.

Figure 28. Washington, DC, Tide Gauge Data

Source: National Oceanic and Atmospheric Administration Tides and Currents, Mean Sea Level Trend



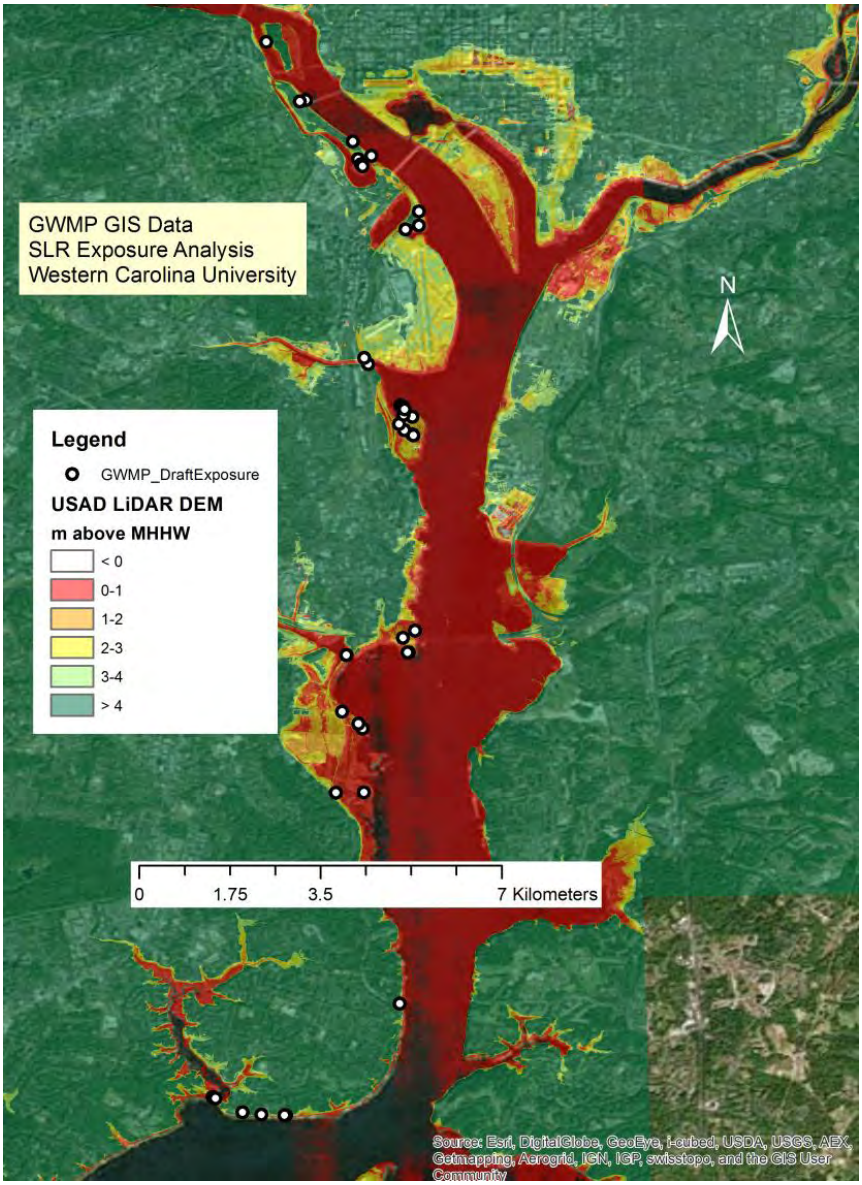
4 U.S. Army Corps of Engineers, 2013. Sea-level change calculator: http://www.corpsclimate.us/ccaceslcurves.cfm

The National Park Service, in collaboration with Western Carolina University, conducted a study that estimated the exposure of all park assets (not limited to just transportation) to 1 meter (3.28 feet) of sea level rise, which is a realistic probability during the next 100 to 150 years per the International Panel on Climate Change projections. The study created exposure maps for the parks analyzed along the Potomac and Anacostia Rivers (Figure 29).

As part of this effort, assets were characterized as high exposure or low exposure based on their vulnerability to the 1-meter sea level rise threshold. Assets were classified as being in the high exposure category if a 1-meter rise in sea level would make them vulnerable. The study also assigned assets a CRV, which indicates the estimated cost of labor and material needed to replace the asset at its present configuration, with respect to its function and extent.

Figure 29. Sea Level Rise Exposure Analysis, George Washington Memorial Parkway

Source: Sea Level Rise Exposure Analysis, Western Carolina University



As shown in Table 17, it is estimated that 9% of the transportation assets in the National Capital Region are categorized as high-exposure assets. The CRV of these assets in the NCR parks is estimated at $491 million.

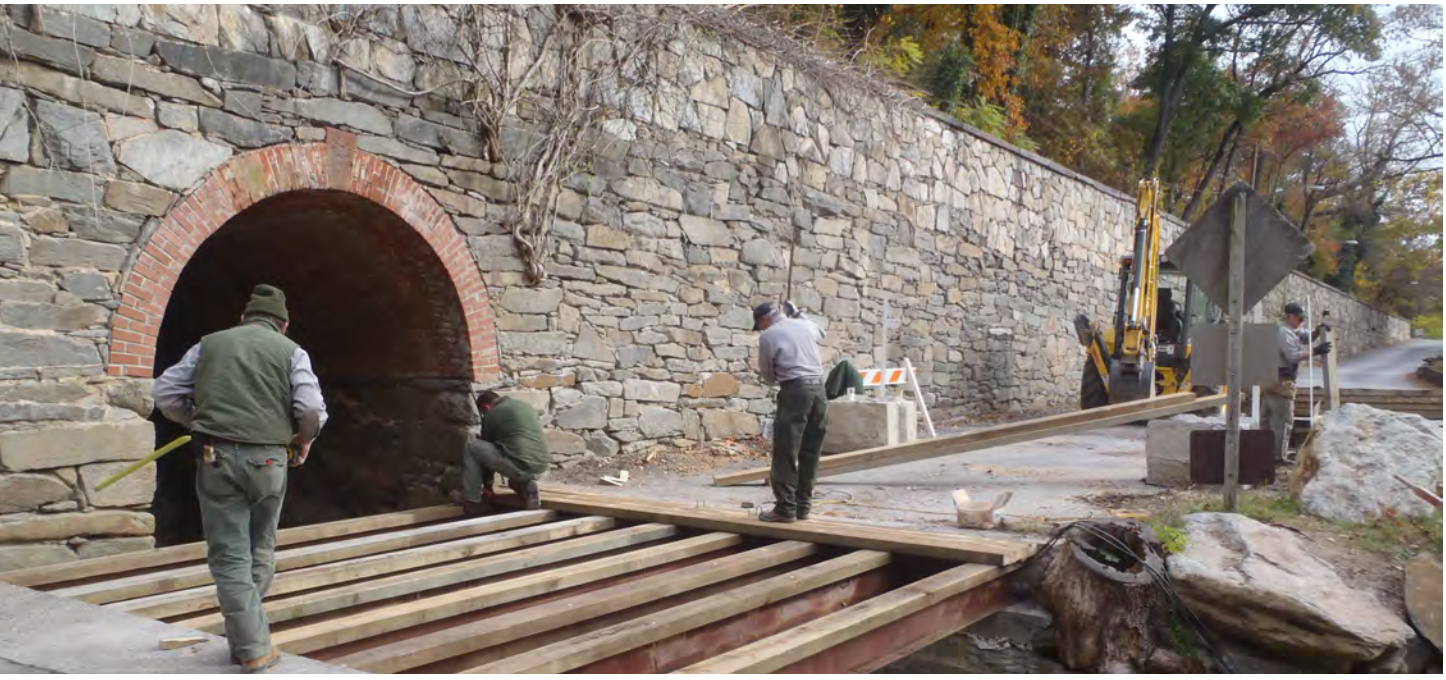
As expected, parks and their assets along the Potomac and Anacostia Rivers, including many of those within the National Mall, are at the highest risk of impact from 1 meter of sea level rise.

Table 17. High-Exposure Assets to 1-Meter Sea Level Rise in NCR Parks

Source: Sea Level Rise Exposure Analysis, Western Carolina University[5]

NCR Administrative Group	Total # of Transportation Assets	# of High Exposure Assets	High Exposure Assets CRV ($)
Antietam National Battlefield	27	13	$72,933,000
Chesapeake & Ohio Canal National Historical Park	452	2	$5,208,000
George Washington Memorial Parkway	218	28	$56,415,000
Harpers Ferry National Historical Park	103	-	$-
National Capital Parks – East	57	4	$582,000
National Mall and Memorial Parks	155	62	$352,408,000
Potomac Heritage National Scenic Trail	2	2	$2,063,000
Rock Creek Park	159	1	$1,905,000
The White House and President's Park	16	-	$-
Total	**1189**	**112**	**$491,575,000**

Chesapeake and Ohio National Historic Park



5 Study ongoing. Data from study aggregated by NCR administrative group. The Potomac Heritage National Scenic Trail is listed separately as it crosses multiple administrative groups.

Storm Surge

The National Park Service is working with the University of Colorado, Boulder, to study potential impacts of storm surge and illustrate the extent to which a park would be flooded by a hurricane. These impacts are shown for storms based on their wind speed (Category 1–5 on the Saffir-Simpson scale as applicable to the region). Overlay maps of the storm surge polygons with park boundaries were created using the National Oceanic and Atmospheric Administration's Sea, Lake, and Overland Surge from Hurricanes model. A range of surge scenarios from Category 1 (at mean tide) to Category 4 (at high tide) for NCR parks is shown in Figure 30 and Figure 31. In both cases, storm surge impacts are most significant within the Potomac and Anacostia watersheds. In the worst-case scenario, storm surge flooding is extensive, impacting most, if not all, parks along both rivers as well as the entirety of the National Mall area and many associated memorials.

Figure 30. Potential Storm Surges for NCR Parks During Category 1 (Mean Tide) Hurricanes

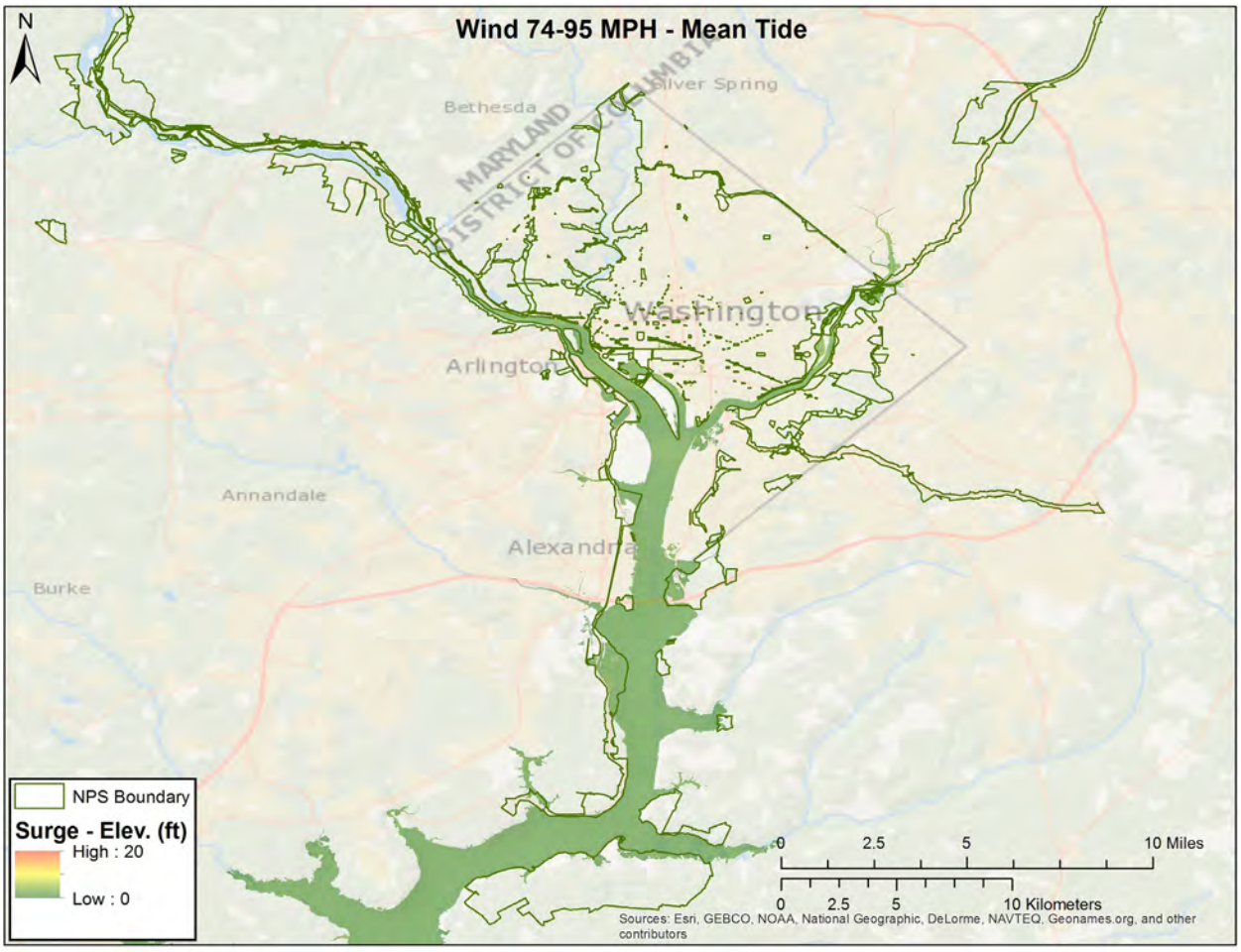
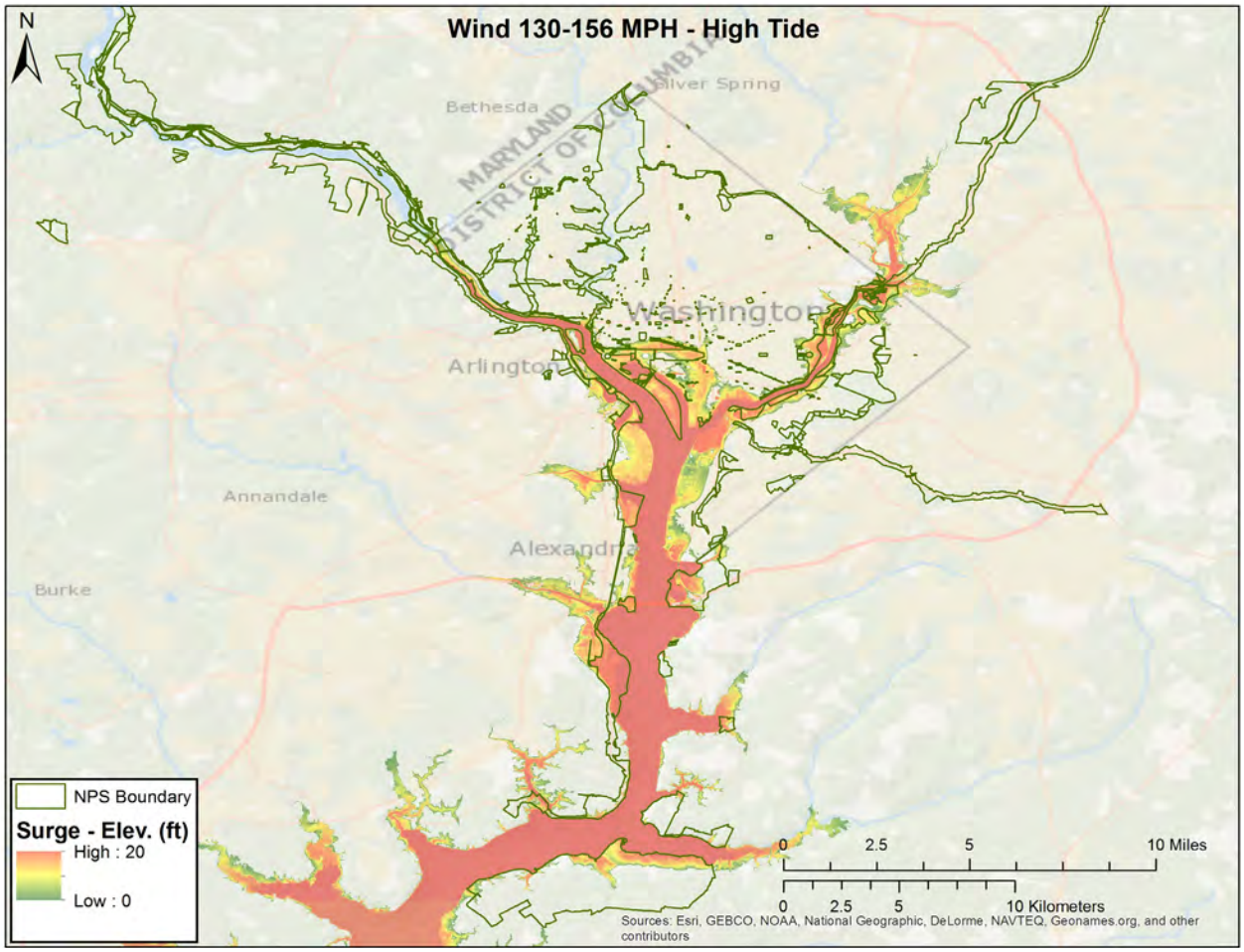


Figure 31. Potential Storm Surges for NCR Parks During Category 4 (High Tide) Hurricanes

Source: Sea Level Change in the National Park System, University of Colorado, Boulder



Harpers Ferry National Historic Park

Riverine Flooding

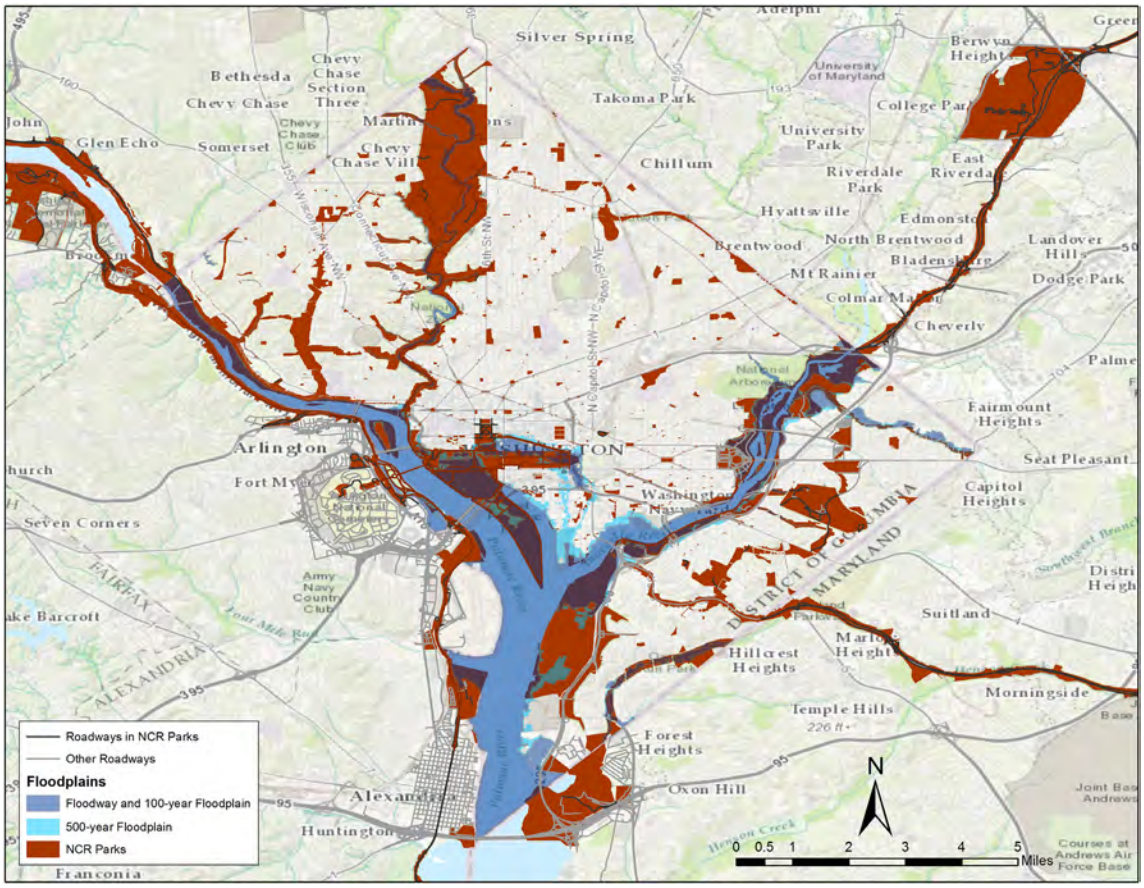
The National Capital Region is at risk of both overbank and urban drainage flooding. Overbank flooding is a result of excess precipitation in the river catchment areas, while urban drainage flooding is caused when the run-off volume exceeds the drainage system's capacity. For example, park sites in the National Mall and Memorial Parks, including East and West Potomac Parks, are at risk for severe flooding despite flood control measures like levees that have been constructed to alleviate the risk. Elsewhere in the National Capital Region, high rates of urbanization and incidences of impervious surfaces cause urban run-off, increasing the risk of flash flooding.

For illustrative purposes, the Federal Emergency Management Agency's (FEMA's) floodplain data for Washington, DC, was overlaid with park boundaries and roadway assets within the park extents (Figure 32). The National Flood Hazard Layer dataset was used to determine the effective flood risk for the region.

A geospatial analysis of all roadway assets in the NCR parks that intersect the floodway, represented by 100-year and 500-year floodplains, indicates that 81 miles of roadways in the region are at risk of flooding. Areas where flooding risk has been reduced due to the presence of levees or other infrastructure have not been included in this estimate. A more thorough analysis of the elevation of roadway assets should be conducted to accurately ascertain their flood risk. A roadway asset intersecting the floodplain does not, by definition, mean that the asset is at risk of flooding for a 100-year or 500-year event. However, it is likely that in the case such event does occur, intersecting roads and traffic control equipment also could be affected, resulting in significant access constraints to the facility.

Figure 32. Illustrative Floodplain Map Overlay with NPS Transportation Infrastructure in Washington, DC

Source: Federal Emergency Management Agency and National Flood Hazard Layer dataset.



Air Quality

Through provisions of the Clean Air Act, the Environmental Protection Agency (EPA) establishes National Ambient Air Quality Standards for ground-level ozone and other criteria air pollutants. Areas that fail to achieve these standards are thereby designated by EPA as "nonattainment" or "maintenance" areas. The entire metropolitan Washington region, which encompasses a majority of the National Park Service's National Capital Region, is presently designated as a nonattainment area for ozone[6].

The District Department of Energy and Environment operates a 24-hour air monitoring network which includes five locations that measure air pollutants in the ambient outdoor air and surface meteorological conditions. Monitoring data is crucial in determining compliance with EPA's air quality standards and supporting timely reporting of air quality forecasts. It also tracks the long-term air quality to gauge the effectiveness of control and abatement strategies. Using this data, plus data from another 16 monitors in Virginia and Maryland, the Metropolitan Washington Council of Governments (MWCOG) provides daily air quality forecasts for the metropolitan Washington region through the Air Quality Index. The Air Quality Index is a national index for reporting forecasted and daily air quality. It explains how clean or polluted the air is, and highlights associated health concerns.

Parks in the National Capital Region are affected by air pollution from the same sources, like industrial and mobile sources, that impact the entirety of the region. Impacts of air pollution include reduced visibility, health issues, and degradation of natural resources. Table 18 presents a summary of the EPA Air Quality Index within the metropolitan Washington region from 2009 through 2016. Following severe summers in 2010, 2011, and 2012, unhealthy air days have continued to decrease throughout the region.

Cumberland Visitor Center Plaza along the Chesapeake and Ohio Canal Towpath

6 The majority of NCR park units are located in the MWCOG/Transportation Planning Board area. However, some park units are located in the Hagerstown Eastern Panhandle Metropolitan Planning Organization region, which is under attainment status for all critical pollutants, and the Baltimore Metropolitan Council (BMC) region, which also is under nonattainment for ozone.

Table 18. Number of Days Annually with an Air Quality Index in an Unhealthy Category

Year	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy
2016	13	0	0
2015	13	1	0
2014	9	1	0
2013	13	0	0
2012	24	7	1
2011	24	9	0
2010	35	12	0
2009	10	0	0

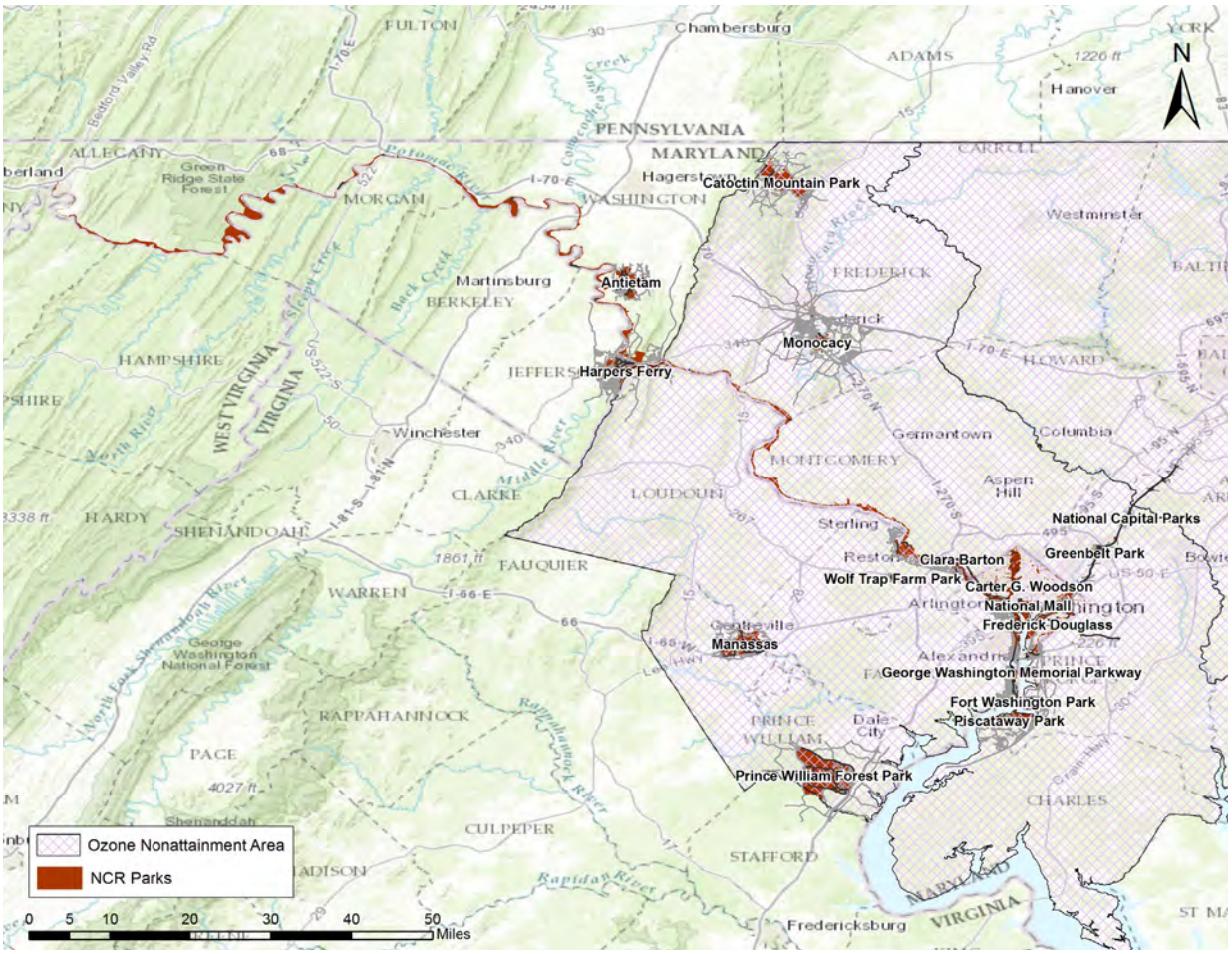
- **Unhealthy for Sensitive Groups** — Members of sensitive groups, children and adults with respiratory and heart ailments, may experience health effects and should limit time spent outside. The general public is not likely to be affected.
- **Unhealthy** — Everyone may experience health effects and should limit their outdoor activity; members of sensitive groups may experience more-serious health effects.
- **Very Unhealthy** — Everyone may experience more-serious health effects and should avoid outdoor activities, especially individuals with heart and breathing ailments, children, and older adults.

Harpers Ferry National Historic Park

There is no evidence that the parks within the National Capital Region experience air quality issues that are more severe than the region as a whole. The most likely site-specific "hot spots" are for pedestrians and cyclists walking or riding adjacent to streets within the National Mall, GWMP, and Rock Creek and Potomac Parkway, where emissions from vehicles, particularly during peak travel periods on hot and stagnant summer days, can be particularly concentrated.

Figure 33 shows the extent of the nonattainment area relative to the location of parks in the National Capital Region. The majority of parks are located in the nonattainment area. This presents an opportunity to qualify for funding through federal programs like the Congestion Mitigation and Air Quality (CMAQ) improvement program for agencies that undertake transportation improvements that have a beneficial effect on air quality in the region.[7]

Figure 33. NCR Parks Within the Ozone Nonattainment Area



7 CMAQ funds are primarily awarded to state, metropolitan planning organizations, or local governments. The National Park Service is eligible to apply in partnership for NPS projects. More information is available at https://www.nps.gov/transportation/pdfs/CMAQ_Fact_Sheet_Final.pdf and https://www.fhwaapps.fhwa.dot.gov/cmaq/pub.

Regional Issues and Opportunities

Culturally Significant Assets

Transportation assets in the National Capital Region include cultural resources such as national parkways, scenic byways, and historic trails, bridges, tunnels, canals, and landmarks. This is particularly challenging since many components of the NPS transportation system facilitate travel for both park visitors and regional commuters, resulting in increased effects on the quality and integrity of sensitive natural and historic resources. The degrading effect that significant volumes of traffic can have on cultural resources is a critical area of concern. The National Park Service maintains inventories of these culturally significant assets to track facility condition and maintenance status.

George Washington Memorial Parkway

Recommended Strategies

- Encourage complete and consistent reporting on asset conditions to properly address roadway needs.
- Educate motorists (recreation and non-recreation) on the culturally significant intent and specific design features of NPS historic transportation assets.
- Develop and disseminate guidance on best management practices for preserving culturally significant transportation assets in good condition. This guidance should include special contract requirements, congestion management solutions, safety considerations, and context-sensitive design solutions for the treatment of culturally significant transportation assets.
- Explore the implementation of technology to manage transportation demand and deliver traveler information in a nonintrusive manner.
- Geolocate all transportation assets, historic and non-historic, and conduct a systemwide risk assessment to fully understand asset risk related to severe weather events and other critical factors.
- Ensure that rehabilitation/reconstruction of assets includes best practice strategies to enhance the assets' resilience.

Natural Resources and Resiliency

Variations in atmospheric conditions result in severe weather events that will impact transportation assets across the National Capital Region. One of the ways the National Park Service is helping to address impacts due to severe weather events is through the CFP program, which provides park units with tools and resources to aid resiliency efforts. However, given the National Capital Region's location in the Chesapeake Bay watershed and proximity to its tributary rivers, sea level rise, storm surge, and severe storm events resulting in riverine flooding are considered the most significant impacts that have a bearing on the long-term sustainability and resiliency of NPS transportation infrastructure. These effects may be particularly serious in park units bordering the Potomac and Anacostia Rivers, where rising water levels could affect park transportation assets.

Recommended Strategies

- Promote best practices on stormwater management.
- Improve collaboration opportunities with state transportation agencies and regional planning organizations to learn about and participate in air quality and resiliency initiatives taking place across the region.
- Continue to incorporate sustainability into park operations by expanding the deployment of GHG emission-reduction strategies.
- Build and strengthen collaborative partnerships with state transportation agencies and regional planning organizations to share information, best practices, and data related to cultural assets, resiliency, and air quality.

Air Quality

Through provisions of the Clean Air Act, EPA establishes National Ambient Air Quality Standards for ground-level ozone and other criteria air pollutants. Areas that fail to achieve these standards are thereby designated by EPA as either air quality "nonattainment" or "maintenance" areas. The entire metropolitan Washington region, which encompasses most the NPS National Capital Region, is presently designated as a nonattainment area for ozone.

Recommended Strategy

- Build and strengthen collaborative partnerships with local transit providers, bike share programs, and other private mobility providers (e.g., transportation network companies), expand levels of mode choice, and educate visitors on available service to improve air quality and mitigate GHG emissions within park boundaries and on nearby facilities.

Measuring System Performance

Condition of Historic Assets

Preserving cultural resources and values for the enjoyment, education, and inspiration of current and future generations is at the core of the NPS mission. Overall, historic transportation assets, which include national parkways, scenic byways, and historic trails, bridges, tunnels, canals, and landmarks, are currently in better condition than the overall transportation asset portfolio in the National Capital Region. However, some of the highest-priority historic assets—including Arlington Memorial Bridge, George Washington Memorial Parkway, and Mount Vernon Parkway—are in a low-rated condition. Tracking the condition of the highest-priority culturally significant transportation assets over time will enable the National Park Service to gauge its performance in preserving these important resources. National efforts are underway to redefine this performance measure that utilizes different indicators based on asset type (paved assets using pavement condition ratings; bridges using Bridge Health Index; other transportation asset classes using Facility Control Index). Regional efforts will focus on supporting the results of the national analysis.

Performance Measure — Develop a system for tracking and forecasting the condition of culturally significant transportation assets

Baseline

National system 30% complete as of July 2017.

Proposed Target

Within two years after completion of the system at the national level, the National Capital Region will determine the baseline conditions of historic transportation assets and set a target for future condition.

Burnside Bridge in Antietam National Park

GHG Emissions

As part of its commitment to being a climate leader, the National Park Service is taking steps to reduce its GHG emissions. It is actively measuring, inventorying, and reporting aggregate statistics for GHG emissions—from all sources—through servicewide reports. There is currently an aggregate estimate for all NCR parks. Individual NPS park units also have started creating their own GHG inventories using the Climate Leadership in Parks tool, and these park-level inventories often include estimates of visitor vehicle emissions. The National Capital Region is committed to achieving the NPS GHG emissions goal and objectives outlined in the 2016 Green Parks Plan, and in doing so, is also helping regional entities such as the MWCOG meet their GHG emissions targets.

There are three categories of emission "scopes," which are based on the degree of control the National Park Service has over the source of emissions:

- **Scope 1 Emissions:** Direct emissions from sources owned or directly controlled by the National Park Service; for mobile sources (transportation), they consist of the NPS vehicle fleet and other equipment
- **Scope 2 Emissions:** Indirect emissions from electricity and heating sources, cooling, and steam generation that are used by the National Park Service
- **Scope 3 Emissions:** Emissions from sources that are neither directly controlled nor owned by the National Park Service, but that are attributable to its activities; these are primarily emissions from visitor vehicle travel within the parks and park employee commuting

It should be noted that these inventories do not cover visitor vehicle emissions outside the park boundary due to reasons including the control over such emissions by the National Park Service. For example, some parks like GWMP have roadways that carry substantial amounts of through traffic.

Performance Measure — Percent decrease in NPS transportation system GHG emissions from baseline year

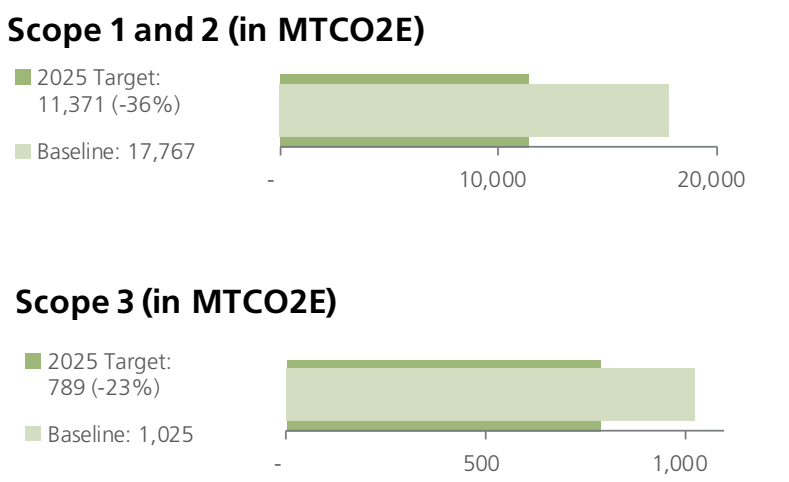
Baseline

2008 baseline emissions for all NCR park units under Scope 1 and 2 emissions (17,767 metric tons of carbon dioxide equivalent [MTCO2E]) and Scope 3 emissions (1,025 MTCO2E) (Regional Data, Source: 2008 Servicewide Inventory).

Proposed Target

Reduce Scope 1 and 2 GHG emissions by 36% by 2025 from the 2008 baseline and Scope 3 emissions by 23% by 2025 from the 2008 baseline.

Figure 34. GHG Emissions Performance Measure



Sustainable Transportation

The Innovative Sustainable Transportation Evaluation Process and Guidance (INSTEP) tool helps decision makers identify opportunities to create and manage more-sustainable transportation assets and to incorporate innovative strategies to avoid, minimize, or mitigate the negative environmental impacts that assets and users cause. When operationalized, the INSTEP tool will give the National Capital Region a greater ability to conduct long-term, performance-based monitoring of resource conditions. Regional efforts will focus on applying the tool to individual park units.

Performance Measure — Apply the INSTEP tool

Baseline

INSTEP process tool has been completed and rolled out in February 2018.

Proposed Target

Every fund manager should use the INSTEP tool by February 2020.

Rock Creek Park

Monocacy National Battlefield

Chapter 6. Visitor Experience

National Capital Region Long Range Transportation Plan

Goal Statement

Provide sustainable and context-sensitive multimodal transportation systems that support the visitor experience through universally accessible and seamless connections between parks, and to and from surrounding communities.

Objectives

- Provide seamless connections for all people in and through parks/units and to surrounding communities
- Incorporate universal accessibility into project planning and design decisions
- Implement easily accessible facilities and payment options in transportation services
- Promote multimodal transportation opportunities that are efficient and easy to use
- Provide options for scenic driving experiences and access to recreation
- Develop enforcement, policy, and other ideas on the use of commercial motor vehicles and heavy vehicles on NPS roads
- Maintain critical connections and transportation services (e.g., roadways, rolling stock)
- Mitigate congestion of "view" jams to protect safety, operations, efficiency, and traffic flow

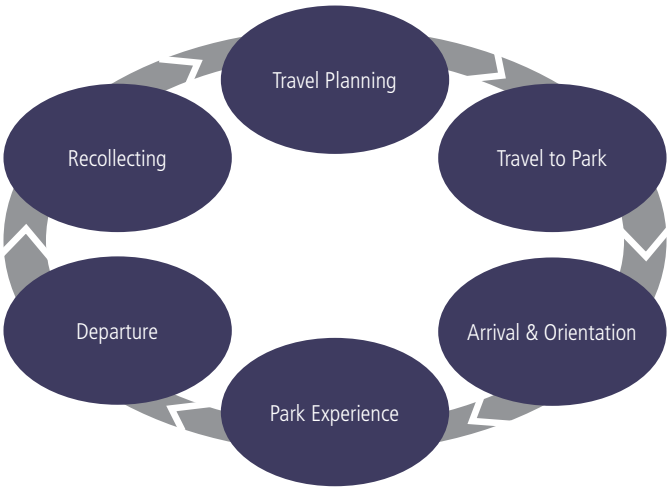
Introduction

The NCR Long Range Transportation Plan (LRTP) goal for visitor experience is driven by the "for the enjoyment, education, and inspiration of this and future generations" part of the NPS mission. Visitor experience is the perceptions, feelings, and reactions a person has before, during, and after a visit to a park unit (Figure 35). Everything about a park's transportation system—including its location, type, and design—strongly influences the quality of a visitor's experience. Visitor experience also includes how a visitor views available opportunities and the quality of services provided at a park site. Visitor experience is an essential, albeit intangible, resource to manage, maintain, and enhance within every NPS unit.

Different user types, including local and nonlocal visitors and recreational and nonrecreational visitors, have varying transportation needs. Although NPS transportation networks primarily serve park units and visitors to those units, their reach extends beyond park unit boundaries. By creating and maintaining a safe, reliable, integrated, and accessible transportation network, the National Park Service can enhance choices for all transportation users, provide easy access to community and park destinations, and have positive effects on the surrounding communities.

The National Park Service is committed to developing and maintaining transportation facilities and services that improve access to park units for all users and maximize the enjoyment of park resources and values. A Call to Action has challenged the agency to better connect parks to people and to provide opportunities for healthy and meaningful visitor experiences. This chapter summarizes visitation and visitors to NCR park units with an emphasis on transportation. It also provides additional analysis and supporting information on specific issues relevant to the National Capital Region.

Figure 35. The Visitor Experience Cycle



Local Visitors
Visitors who live in the local area

Nonlocal Visitors
Visitors who travel from out of the area to visit a park

Recreational Visitors
Visitors who are in a park unit for a recreational purpose (e.g., vacationing)

Nonrecreational Visitors
Visitors who are in or traveling through a park unit for a nonrecreational purpose (e.g., commuters)

Baseline Conditions and Trends

Visitation and Visitor Use in the National Capital Region

When applied to transportation, characteristics of visitor use—which include the amount, type, timing, and distribution of visitor activities and behaviors— help in understanding traveler trends, user transportation needs, and influences on the visitor experience.

Visitation data can be useful in determining the kinds, amounts, and patterns of use in a region, cluster, or park unit. Collection methods within the region include both direct visitor counts and proxies, such as vehicle counts. The Visitor Use Statistics Office uses 92 traffic counters at 13 NCR park units. In addition, data on visitor origins, the timing of visits, visitor patterns of use and distribution throughout park units, and the information sources they use to plan their visits is not consistent across all park units.

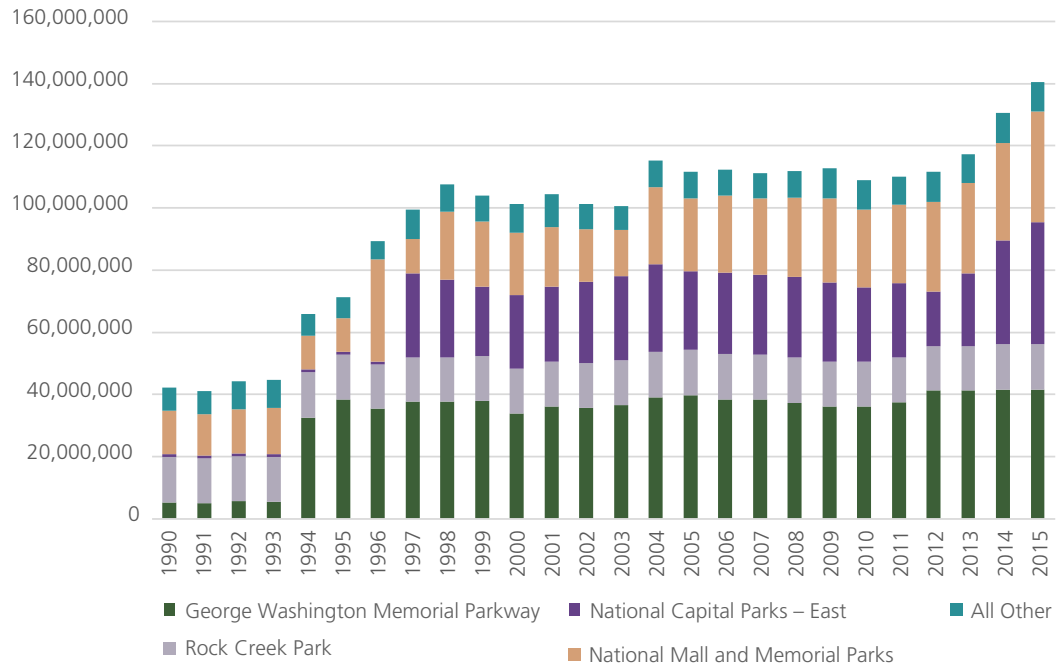
These elements are important bases for the investment decisions transportation planners traditionally make. Having more detailed and accurate information about visitors and how they use park units will help the National Capital Region ensure that its transportation investment decisions are closely aligned with visitors' needs and desires.

Total visitation to NCR park units has grown from 42 million in 1990[1] to 140 million in 2015 (Figure 36). Part of this increase can be attributed to changes in counting methodologies and the establishment of new units. For example, in 1994 and 1996 the George Washington Memorial Parkway (GWMP) and National Capital Parks – East (NACE), respectively started counting nonrecreational visitation along with the recreational visitation.

Figure 36. Annual Visitation to NCR Park Units

Source: NPS Visitor Use Statistics Office

Note: Units added in 1996 (1 unit), 1997 (3 units), 2004 (1unit), and 2011 (1 unit).



1 All visitor-related analysis was conducted using data from 1990 to present day according to recommendations from the LRTP program. Such analysis provides a comprehensive snapshot of what can reasonably be considered "current conditions."

This accounts for an average of 30 million additional visitors annually to GWMP and an average of 23 million additional visitors annually to NACE. Between 1990 and 2015, six new units were designated in the National Capital Region. Most of these units did not have a significant effect on the overall visitation to the region; however, when the World War II Memorial opened in 2004, it began contributing an average of 4.2 million visitors annually. Accounting for these abnormalities, NCR visitation has seen a 2% average annual increase in overall visitation (range between -3% and 11%).

In 2015, the following four busiest parks accounted for roughly 93% of visitation to the National Capital Region (beginning with the most visited):

- George Washington Memorial Parkway
- National Capital Parks – East (including Fort Washington Park, Frederick Douglas National Historic Site, Greenbelt Park, and Mary McLeod Bethune Council House National Historic Site)[2]
- National Mall and Memorial Parks (including Ford's Theatre National Historic Site, Franklin Delano Roosevelt Memorial, Korean War Veterans Memorial, Lincoln Memorial, Martin Luther King, Jr. Memorial, Pennsylvania Avenue, Thomas Jefferson Memorial, Vietnam Veterans Memorial, Washington Monument, and World War II Memorial)
- Rock Creek Park

National Mall

2 Until 1997, NACE and NAMA counted visitation collectively. This collective National Capital Parks Central visitation from 1990–1996 is counted with the NAMA visitation. Individual units (FOWA, FRDO, GREE, PISC) who collected visitation data independent from National Capital Parks Central, but are currently managed by NACE, are represented as NACE in these early years.

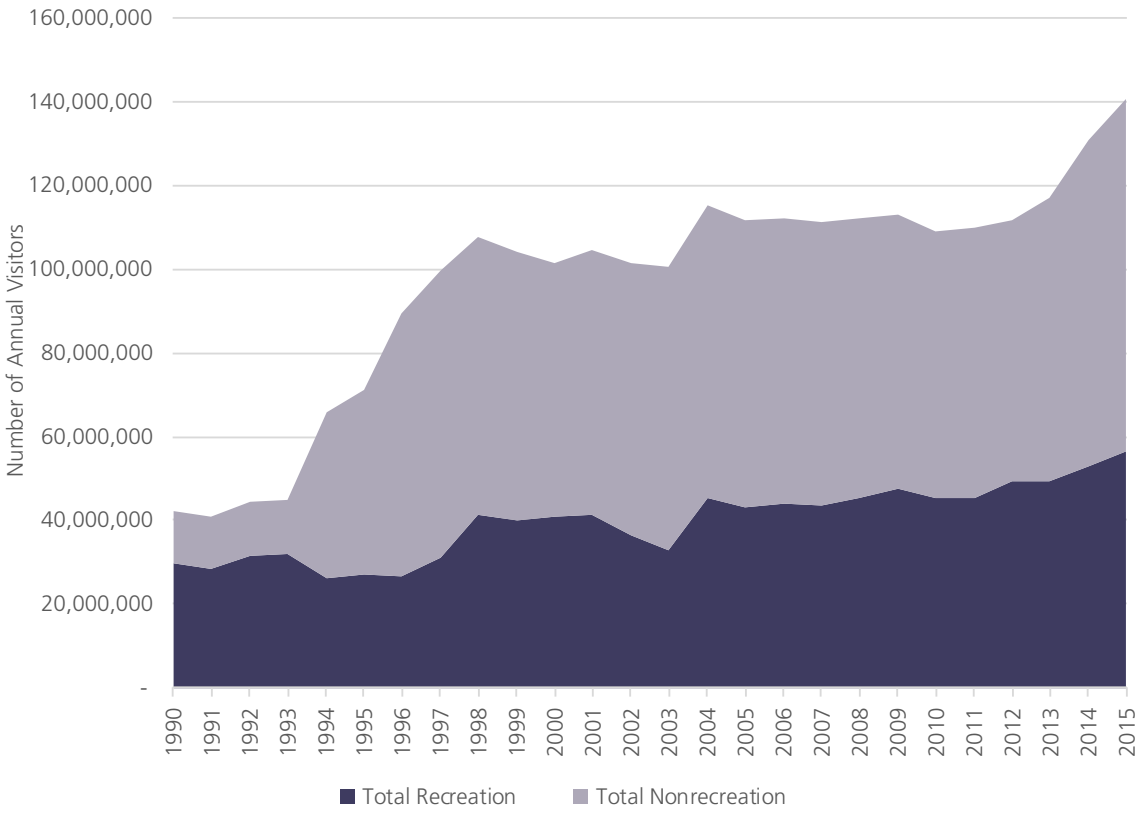
Transportation System Usage

The quality of a user's experience specific to transportation depends on the needs of that type of individual or group using the transportation system or facility. For example, recreation visitors may value access to specific resources, such as trailheads, and may need more traveler information and wayfinding guidance. Nonrecreation visitors may appreciate the scenic vistas, but they primarily require efficient access through NPS lands. The different needs of these two user groups can, at times, create conflict, particularly on parkways that also are commuting routes.

Recreation visits are defined as the entry of a person onto lands or waters the National Park Service administers for recreational purposes, excluding nonrecreation visits and residents within park boundaries. Nonrecreation visits include through traffic (commuters), persons getting to and from inholdings, tradespeople with business in a park, and government personnel (other than NPS employees) with business in a park unit. Figure 37 summarizes total visitation (with a breakdown between recreation and nonrecreation visitation) for the National Capital Region since 1996, when nonrecreation visitation started to be collected more comprehensively across the region. More than half of the total visitation to NCR units can be accounted for in nonrecreation visitation (60%). Of the 33 units in the National Capital Region that report visitation, only eight report nonrecreation visitors, and 3 units represent 98% of the nonrecreation visitation: NACE, GWMP, and Rock Creek Park (ROCR). An analysis of the 10-year trend reveals that both nonrecreation and recreation visitation are growing at units within the National Capital Region (by 12% and 15%, respectively).

Figure 37. NCR Recreation and Nonrecreation Visitation

Source: NPS Visitor Use Statistics Office



Visitor Activities

Currently there is not a comprehensive and reliable source from which to describe visitor activities. This type of information is typically gleaned from visitor surveys conducted at the unit level. However, only five units in the National Capital Region have completed visitor surveys since 2000, limiting the ability to reliably report current visitor activities.

In a study of Washington, DC, residents, the most common reason for visiting NPS parks was sightseeing and second was proximity (which was unique to this region, as nationally the second most ranked reason was vacationing with others). Eighty-five percent of Washington, DC, respondents had visited an NPS unit in their region during the past two years. (Taylor et al. 2011).

Great Falls National Park

Visitor Demographics

A review of the more recent data visitor surveys reveals that visitors to park units within the National Capital Region come from a variety of locations across the country and the world. Given that the Comprehensive Survey of the American Public (CSAP) for the National Capital Region only includes individuals who have a home zip code corresponding to the National Capital Region, it cannot be generalized to the general NCR visitation. Therefore, a discussion of demographics for local and nonlocal visitors follows.

Local Visitors

In the 2009 CSAP, 86% of Washington, DC, respondents[3] said they had visited a unit of the National Park System one or more times during the past year. This is the highest reported of all the NPS regions and significantly higher than the national figure of 61%. Nintey-six percent of the NCR resident respondents had visited an NPS unit in their lifetime (compared to 89% nationally) (CSAP, 2010). Roughly 3% of respondents had recently visited a park unit and identified as Hispanic. Other non-Hispanic respondents in the same category (had recently visited a park and reported a race/ethnicity) included 30% white only, 31% black only, 1% other only, and 3% two or more races/ethnicities.

Nonlocal Visitors

A review of the best available data reveals that visitors to park units within the National Capital Region come from a variety of locations across the country and the world.

3 CSAP provides the National Park Service with a wide-ranging source of information about how visitors and non-visitors relate to national parks. To permit within-region analyses, reports were generated for each of the NPS regions based on the respondent's residency.

Constraints on Visitation

Research has found that transportation can be a barrier to visiting national parks and public lands for communities of color.[4] [5] The CSAP 2010 found that 33% of white respondents agreed with the statement "It takes too long to get to any NPS unit from my home," compared to 54% of African-Americans. Additionally, 25% of Washington, DC, residents reported that finding parking is a constraint to visiting NPS units more frequently, and 20% would rather be spending their free time doing electronic activities (watching videos, playing computer games, etc.). Positively, only 5.5% of Washington, DC, residents reported that NPS units are unpleasant places for them to be.[6] When considering ways to improve the visitor experience at NCR units, 19% of Washington, DC, residents reported that there is not enough information available about what to do once they get to a park unit. Of both Washington, DC, and national respondents, 40% said the one most important thing the National Park Service can do to encourage them to visit is advertise, publicize, and provide more information.[7]

Lincoln Memorial

Accessibility by Transit

Although the vast majority of NCR park units provide adequate vehicular access and connections through various roadways and parking lots, the evaluation of park site accessibility via other multimodal options (including transit) is important to meet visitor needs in the National Capital Region.

Given the proximity of many of the park units to local and regional transit opportunities, the ability to access units via these transit options is important. Of Washington, DC, resident respondents who visited a park between 2008 and 2010, 25% travelled to a park unit by city bus or subway, while 10% walked (CSAP, 2010).

The NCR park sites' accessibility and connectivity by transit were assessed by examining the proximity of transit facilities to each NCR park unit. Some of the different transit facilities included in this assessment were local and regional bus stops, Metrorail stations, other railway stations (e.g., MARC), and Capital Bikeshare stations. Out of the 52 NCR park units that were examined, 40 of them had access to transit facilities within approximately a half-mile from the assumed main location of access of each park site (Figure 38).

The NCR park sites located closer to downtown Washington, DC, (e.g., National Mall and Memorial Parks (NAMA)) are not only more accessible than parks located further from the city, but also are more likely to be accessible via multiple modes of transportation.

With more than 400 stations across Washington, DC, Arlington, Alexandria, and Montgomery County, Capital Bikeshare provides access to 44% of NCR park sites[8] examined.

4 Solop, F., Hagen, K., and Ostergren, D., "Ethnic and racial diversity of national park system visitors and non-visitors," NPS Social Science Program, Comprehensive Survey of the American Public, Diversity Report (2003), 1-13.

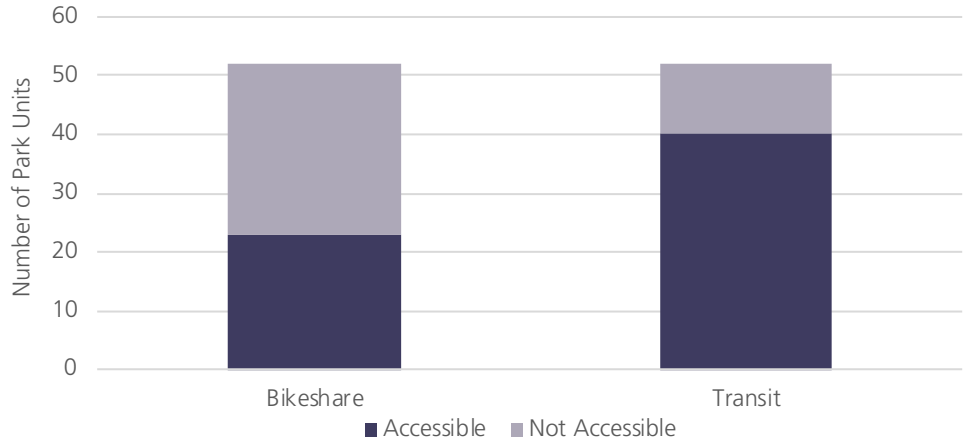
5 Taylor, D., "Meeting the challenge of wild land recreation management: Demographic shifts and social inequality," Journal of Leisure Research (2000), 32(1), 171.

6 Taylor et al. 2000

7 Taylor et al. 2000

8 For analysis purposes, sites were considered accessible if there is a Capital Bikeshare docking station within approximately a half-mile of a park unit boundary.

Figure 38. Count of NCR Park Units Accessible via Capital Bikeshare and Transit



The 12 park sites identified as having no or very limited access to transit facilities (Table 19) were typically located further away from downtown Washington, DC. Despite the limitations to accessing these parks by transit, some of the sites can still be accessed through existing trail connections (most easily by bicycle), like the Lyndon Baines Johnson Memorial Grove on the Potomac and Theodore Roosevelt Island. Similarly, other sites, especially those in more urban areas, also may be accessed through the use of transportation network companies (TNCs) such as Uber and Lyft.

Table 19. NCR Park Sites with No or Limited Access to Transit Facilities

- Antietam National Battlefield
- Baltimore-Washington Parkway
- Catoctin Mountain Park
- Fort Washington Park
- Great Falls Park
- Lyndon Baines Johnson Memorial Grove on the Potomac
- Manassas National Battlefield Park
- Monocacy National Battlefield
- Piscataway Park
- Prince William Forest Park
- Theodore Roosevelt Island
- Wolf Trap National Park for the Performing Arts*

**Wolf Trap National Park for the Performing Arts provides transit access during events.*

Some of the larger NCR park sites have varying levels of accessibility and connectivity depending on the location within the site. For example, ROCR, the Chesapeake & Ohio Canal National Historic Park, and the Potomac Heritage National Scenic Trail are three NCR units that are easily accessible by transit at certain locations, but not throughout the entirety of the site. These sites tend to be comprised of extensive trail networks that traverse both rural areas with limited connections and densely populated areas, such as central Washington, DC, with access to multiple transit facilities. Since these parks are easily accessible at key locations, they were deemed transit accessible for the purpose of this analysis.

Similarly, the Civil War Defenses of Washington—an NCR park unit that is comprised of several smaller sites—also is unique, largely due to the fact that each site has a varying degree of accessibility. The majority of the sites, however, are accessible via transit and were therefore collectively determined to be accessible by transit.

Pedestrian and bicycle volumes on the region's bridges are significant and are located close to many NCR park units. Table 20 provides the bicycle and pedestrian volume for some of the region's bridges.

Table 20. Pedestrian and Bicycle Volumes on Potomac River Bridges

Source: Arlington County (June 2017); District Department of Transportation (August 2015)

Bridge	Daily Pedestrian Volume	Daily Bicycle Volume	Total Daily Volume
Key Bridge (US 29)	4,150	2,010	6,160
Theodore Roosevelt Bridge (I-66/US 50)	230	500	730
Arlington Memorial Bridge	1,200	1,100	2,300
14th Street Bridge (I-395)	315	2,350	2,665

Changing Trends

NPS Emerging Technology Macro Trends

In 2013, the National Park Service conducted research on emerging technology trends and implications that may inform NPS strategic investment and policy decisions as part of the NPS National LRTP. The published report, *Emerging Technologies–NPS National LRTP*, outlines some of the key findings. The report mainly looked at trends in communication technologies, vehicle technologies, and infrastructure technologies. Overall, progress in technology will benefit the National Park Service both as a consumer of better technology and as a provider of transportation services using these technologies. The key findings of the report are excerpted below.

Communication Technologies

Global Positioning System (GPS)-enabled smartphones are enhancing transportation data collection and information dissemination, offering new data collection methods for the National Park Service and changing public expectations for NPS communications. Technological advances may offer the National Park Service more context-sensitive approaches to managing transportation systems. Crowdsourcing and open data movements are growing, which may offer the National Park Service opportunities to harness these methods to inform transportation planning.

Vehicle Technologies

Safety in vehicles is improving due to advances in collision avoidance and crash survivability, which should reduce the number and severity of crashes in NPS units. Related vehicle advances are improving accessibility to people with disabilities, which should improve access and visitor experience at NPS units. Automation of ground vehicles and aircraft is approaching, potentially improving NPS operations efficiency and safety, as well as access to NPS units. Vehicles are using less energy due to more-efficient engines and cars, reducing the expense of traveling to national parks and emission of vehicles in NPS units. Vehicles are increasingly loaded with entertainment, information, and telemetry devices that open new communication opportunities for the National Park Service. At the same time, these devices may increase driver distractions and alter visitor experience.

Infrastructure Technologies

New infrastructure technologies and materials offer a combination of faster construction, increased durability, and lower environmental impact, helping to speed project completion and extend the lifespan of transportation infrastructure. Many new technologies reduce project duration through prefabrication, use of on-site materials, or otherwise minimizing the amount of required on-site work. Other new technologies reduce the environmental impact at both the job site and the environment at large. Innovations in road safety technologies reduce the risk of vehicular accidents.

Additional Perspectives on Vehicle Technology

Especially since 2013, one of the fastest-evolving areas of technology is related to vehicles. Vehicle technologies will most likely continue to advance in the coming years, including changes in connected and autonomous vehicles (CV/AV). There is a lot of uncertainty about how and when these changes will become widespread, but some entities have begun to make predictions about how fast these new technologies could become mainstream and what their impacts might be. Some potential effects of the increased role of CV/AV gathered from a variety of research efforts include:

- Driverless systems may expand roadway capacity and reduce congestion by using GPS technologies to efficiently route vehicles through traffic jams. Specifically, when congestion occurs, computerized systems would divert a certain percentage of vehicles off the highways and onto surface streets. This has the potential to cut travel times, reduce fuel wasted while sitting in traffic, and improve productivity. Moreover, AV systems may likely adjust routing patterns for trucks and other heavy vehicles to avoid vulnerable infrastructure, thereby cutting costs and preserving the lifespan of critical roadways and bridges.[9]
- By 2040, autonomous cars may become our primary means of transport, and all the rules are up for debate. Just as car design will fundamentally change once things like forward-facing seats, mirrors, and pedals are no longer necessary, the way we structure physical space could evolve. While acknowledging significant uncertainty, McKinsey's research, based on interviews with 30 experts worldwide, predicts that by 2050, we might need just 75% of the space currently reserved for parking our cars. McKinsey pegs the savings on repair and health care bills alone at $180 billion in the US, predicting a 90% drop in crashes.[10]
- From an Organization for Economic Cooperation and Development study on how self-driving cars could change city traffic: The first thing that would go, according to the study, is public transit. "For small and medium-sized cities, it is conceivable that a shared fleet of self-driving vehicles could completely obviate the need for traditional public transport," the researchers write. "TaxiBots combined with high-capacity public transport could remove 9 out of every 10 cars in a mid-sized European city." The study did not examine US cities.[11]

Changes related to vehicle technologies should be monitored by the National Park Service, specifically for potential considerations regarding parking and access to NPS facilities.

9 http://www.brookings.edu/blogs/techtank/posts/2015/07/07-autonomous-vehicle-revenue

10 http://www.mckinsey.com/industries/automotive-and-assembly/our-insights/ten-ways-autonomous-driving-could-redefine-the-automotive-world

11 http://oecdinsights.org/2015/05/13/the-sharing-economy-how-shared-self-driving-cars-could-change-city-traffic/

Transportation Culture

In many of the NCR park units, particularly parkways, traveling along the roads themselves via bike, bus, or personal vehicle is one of the park's primary visitor experiences. However, with a new generation of park visitors comes changes in transportation culture. As more and more people prefer to take advantage of multimodal transportation services as opposed to owning vehicles, different facilities must be considered to accommodate different visitor transportation mechanisms (e.g., cars, bicycles, motorcycles, tour buses, etc.) on the same stretch of road during peak use times.

Balancing the needs of cyclists, cars, and motorcycles presents significant challenges to park managers from both safety and visitor experience perspectives. Considering the popularity of the Washington, DC, area as an international destination, park units also must accommodate international visitors who may or may not be familiar with American transportation practices. The following sections provide an overview of some of the main trends in the region associated with changing multimodal transportation culture. Generally, during the past 10 years, the National Capital Region has seen a decline in single-occupant travel and an increase in reliance upon alternative modes such as public transportation, TNCs, or active transportation.

DC Circulator at Union Station

One of the transportation-related goals of Region Forward, a planning guide developed by the Metropolitan Washington Council of Governments (MWCOG) to prepare for the growth expected in the region by 2050, is to "seek a broad range of public and private transportation choices for our Region which maximizes accessibility and affordability to everyone and minimizes reliance upon single occupancy use of the automobile."[12]

Related to public transportation, the Washington Metropolitan Area Transit Authority (WMATA) rail and bus network (Metro), the largest system in the region, provides approximately 1.2 million trips per day and that demand is forecasted to grow by about 50% by 2040.[13]

While public transportation is widely available in the National Capital Region, the use of TNCs as a mobility strategy in the National Capital Region is becoming increasingly popular. TNCs such as Uber and Lyft are being used for trips around the National Capital Region. Advances in communication and vehicle technology have allowed these TNCs to provide on-demand service to flexible destinations with a quick response time at an affordable price. Visitors to the region who may be unfamiliar with the public transportation system or even taxis may find it easier to use a TNC, as the user interface for the mobile application is essentially the same regardless of what city or country the user is in. It requires little, if anything, of the roadway network or transit systems as it is powered by GPS technology.

Another element of multimodal transportation that is growing in the National Capital Region is active transportation—walking or bicycling. Local jurisdictions and state departments of transportation are putting more emphasis on making streets safer and more accommodating for pedestrians and bicyclists including implementing "complete streets" policies and designs.[14] Examples of elements that are being implemented, predominately in the more densely populated areas of the region, to promote safety and increased use of active transportation modes include buffered or physically separated bike lanes and pedestrian crossing improvements. Some potential pedestrian improvements include raised crosswalks or pedestrian High-Intensity Activated crosswalk signals (which are activated to stop traffic on roadways at non-intersection pedestrian crossing point), and improvements to trails such as widening or repaving. These types of improvements could be considered on NPS-owned roadway assets with high pedestrian and bicycle activity.

Reflecting Pool

12 https://www.mwcog.org/regionforward/

13 http://www.wmata.com/momentum/momentum-full.pdf

14 Federal Highway Administration defines complete streets as "A transportation facility that is planned, designed, operated, and maintained to provide safe mobility for all users, including bicyclists, pedestrians, transit riders, and motorists appropriate to the function and context of the facility." Examples of some facilities include (https://www.fhwa.dot.gov/publications/publicroads/10julaug/03.cfm)

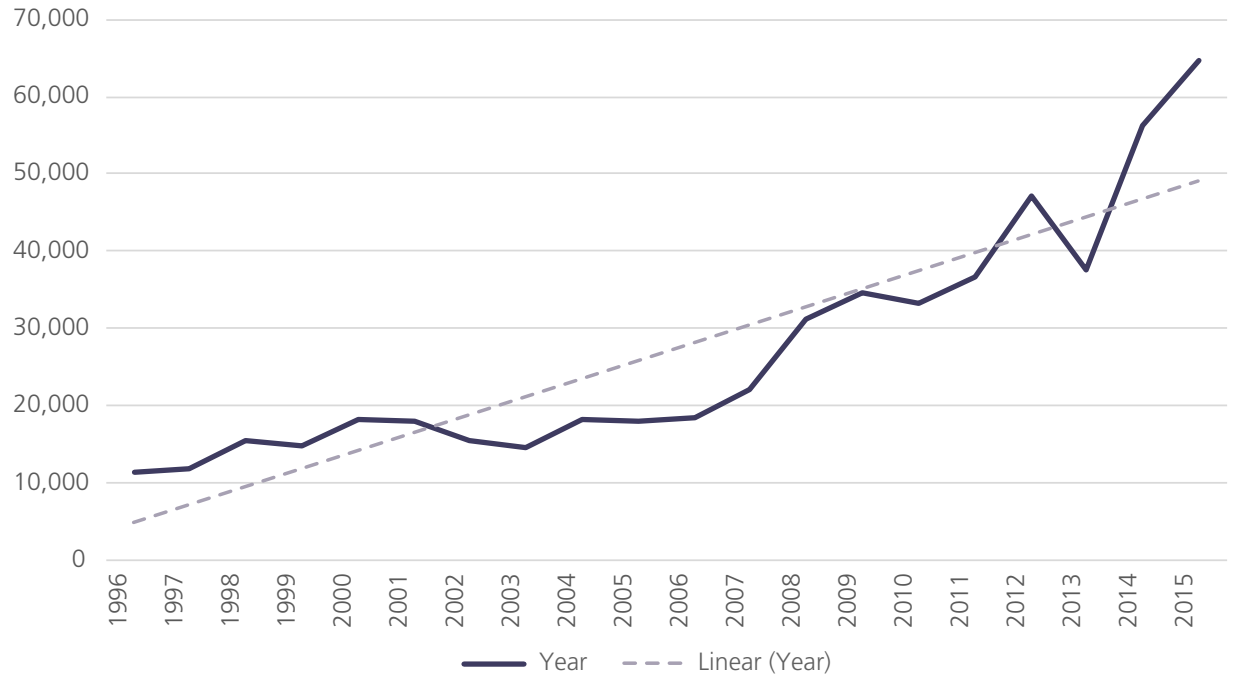
Regional Issues and Opportunities

Growth in Visitation Versus Preservation

NPS park sites in Washington, DC, along with the National Capital Region in general, are experiencing a trend of increased visitation. Park units in the region are challenged to find a balance between accommodating this increase in visitation while continuing to preserve resources. Many park units also must contend with the added pressure of external development at or along adjacent sites or roadways. This pressure may threaten preservation at certain NPS sites in the region and lead to degraded resources and assets, as well as overcrowding. The importance of striking a balance between park preservation and accommodating increased visitation should be considered in transportation planning.

Between 2014 and 2015, the National Capital Region saw a 6.7% growth in recreation visitation. This increase was second only to the growth seen in the NPS Intermountain Region, and above the national average (4.9%). As reported above, this trend has been relatively stable during the past 15 years, where the National Capital Region has seen sustained average growth in total visitation of around 2% annually. A number of NCR units have seen their visitation grow by significantly greater rates during the past 10 years. An example of this growth is represented in Figure 39 for Monocacy National Battlefield Park in Frederick County, MD.

Figure 39. Annual Visitation to Monocacy National Battlefield



This increase in use is putting pressure on park resources and facilities. For example, when parking areas become full, visitors sometimes park in nearby areas that are not designed to accommodate vehicles (e.g., along roadsides, on road shoulders). Inappropriate parking can lead to roadside impacts to vegetation, wildlife, and habitats.

While high visitor use is a concern at many park units in the region, no regional data is currently available to help quantify impacts to natural and/or cultural resources. To better understand this issue, the region could gather information related to capacities and use at high-use locations and work toward a comprehensive approach to identification and quantification of transportation-related resource impacts.

A review of the unit foundation documents for the region indicates that 12 park units have issues relating to high visitor use and are requesting visitor use management plans, and seven parks are requesting transportation plans. Table 21 provides a summary of these planning needs.

Table 21. Park Units Requesting Visitor Use Management or Transportation Plans

Park Unit	Visitor Use Management Plan	Transportation Plan
Antietam National Battlefield	High	Medium
Ford's Theatre National Historic Site	High	Not Listed
George Washington Memorial Parkway	High	Low
Harpers Ferry National Historical Park	Medium	Not Listed
Manassas National Battlefield Park	Medium	High
Monocacy National Battlefield	High	Not Listed
National Mall and Memorial Parks	Low	Not Listed
Prince William Forest Park	High	Low
Rock Creek Park	High	Medium
The White House and President's Park	High	Not Listed
Wolf Trap National Park for the Performing Arts	High	High

Recommended Strategies

- Develop visitor use management plans, interpretations plans, and transportation plans for the park units that have identified medium- and high-priority needs based on increased visitor use.
- Establish education methods that leverage partners, media, and social media to educate the public on the role and value of NPS transportation assets.

Connectivity Between NPS Sites

Connectivity between NPS park sites is a major challenge for the National Capital Region. Currently, lesser-known park sites, especially those that are located further from downtown Washington, DC, have not reached their full visitation potential due to lack of connectivity and transit options. Many nonlocal visitors travel to the region from around the country without access to a car; therefore, it is important to promote existing public or private transportation options that connect multiple sites and to pursue alternate access options that might not currently exist.

One of the National Park Service's primary goals in A Call to Action (2015) is to not only provide adequate access to the park sites from surrounding communities, but also provide access between different park units. In the National Capital Region, connectivity to and between NPS park sites is a challenge for some park units, specifically for the lesser-known park sites that are located further from downtown Washington, DC. Gaps in connectivity and transit is a barrier to those visitors who choose or need to access these parks without a personal vehicle. As such, it is important to promote and enhance existing public or private multimodal transportation options to improve access and connectivity to NCR park sites without depending on personal vehicles.

Recommended Strategies

- Collaborate with TNCs to establish drop-off and pick-up points for NCR park units.
- Leverage interpretive planning process to address thematic links between parks related to transportation.

Mount Vernon Trail

First- and Last-Mile Connectivity

In addition to access between sites, first- and last-mile connectivity to the parks is a challenge for the region. As it relates to park access, first- and last-mile connectivity refers to the beginning or end of a visitor's trip to a park unit without the use of a personal vehicle. For example, this would include connections between the nearest bus stop and the park entrance, or connections between state- or locally-maintained trails and NPS trails. Limited first- and last-mile connectivity restricts the ability of visitors to access NPS units without the use of a personal vehicle, and reduces access to other public transit opportunities.

Although a majority of the 40 transit-accessible sites technically have viable first- and last-mile connection through sidewalks, actual access may be inconvenient or impractical. The following seven NCR park sites could improve their first- and last-mile trip or options through the construction of sidewalks or additional pedestrian connections:

- Anacostia Park
- Clara Barton National Historic Site
- Fort Foote Park (Civil War Defenses of Washington)
- Glen Echo Park
- Greenbelt Park
- Oxon Cove Park and Oxon Hill Farm
- Kenilworth Park and Aquatic Gardens

Among the sites listed above, Anacostia Park and Kenilworth Park & Aquatic Gardens are park sites that may be inconvenient to access by pedestrians, but may be easier to access for cyclists due to the presence of trail connections or on-street bicycle facilities connecting the site from nearby transit stations.

The design and construction process would need to be a collaborative effort between the National Park Service and local and state transportation agencies, especially if they were to be constructed on land not currently owned by the National Park Service.

NPS-Owned-and-Operated Shuttles

Only one NCR park unit provides first-and-last mile connectivity through the use of NPS-owned shuttle service—Harpers Ferry National Historic Park (HAFE).

The HAFE shuttle bus service is considered to provide critical access, meaning that it provides access to a park site that is not readily accessible to the public due to geographic constraints, park resource management decisions, or parking lot congestion. This service, however, only operates within the park itself. Ridership for the shuttle service is summarized in Table 22.

Table 22. 2015 Passenger Boardings for NCR Park Shuttle Services

Park	System Name	2013 Boardings	Vehicle Ownership
Harpers Ferry National Historical Park	HAFE Shuttle Transport	367,018	National Park Service

Recommended Strategies

- Ensure regular updates of the "Plan Your Visit" websites for each park unit, including information regarding multimodal first- and last-mile access.
- Collaborate with regional partners to install signage and other wayfinding guidance on the "last mile" between transit stops and NCR park unit entrances.
- Identify barriers to accessibility and create a Self-Evaluation and Transition Plan for each park/unit.

Social Equity

The National Capital Region has many units that are located in or near socioeconomically diverse neighborhoods, and ensuring that all social and ethnic groups have equitable access to parks and park resources is critically important. Similar to connectivity between sites and first- and last-mile connectivity, there is room to improve upon the types and amounts of access modes to NPS units to ensure equitable access.

In its 2015 document, A Call to Action: Preparing for a Second Century of Stewardship and Engagement, the National Park Service outlines actions to improve connections to parks. One of the main goals in the theme of connecting people to parks that relates to social equity is to "welcome and engage diverse communities through culturally relevant park stories and experiences that are accessible to all." Some actions identified to help achieve this goal and that highlight the National Parks Service's commitment to social equity include conducting in-depth, ongoing conversations with citizens in diverse communities to understand their needs, and having proactive Rivers, Trails, and Conservations Assistance programs that help foster connections with citizens to the outdoors in urban areas with the least access to parks.

To better visualize the lack of connectivity and social equity in the National Capital Region, census data was gathered and displayed on a series of maps. Figure 40 highlights the areas with certain percentages of families living below the poverty line. Maps highlighting the areas with certain percentages of people born outside of the United States and the areas with certain percentages of people classified as Hispanic or non-white can be found in Figure 41 and 42. These categories were chosen to be consistent with the United States Environmental Protection Agency definition of environmental justice population groups.

Among the park units that have limited modes of access or connectivity, those located in the Northeast or Southeast quadrants of Washington, DC, and in Prince George's County, MD, are in predominately low-income areas with a large proportion of residents that are Hispanic or non-white and/or born outside the US. Access between park sites such as Anacostia Park, Greenbelt Park, and Kenilworth Park & Aquatic Gardens and surrounding communities will need to be further examined in order to improve existing transit, pedestrian, and cyclist connectivity.

Recommended Strategy

- Collaborate with partners to identify disconnected parks and develop action plans to enhance multimodal access to all communities and users.

The National Capital Region has multiple park units that are located in or near socioeconomically diverse neighborhoods, and ensuring that all social and ethnic groups have equitable access to parks and park resources is critically important. Similar to connectivity between sites and first and last-mile connectivity, there is room to improve upon the types and amounts of access modes to NPS units to ensure equitable access.

Figure 40. Percentage of Families Living Below the Poverty Line in the National Capital Region

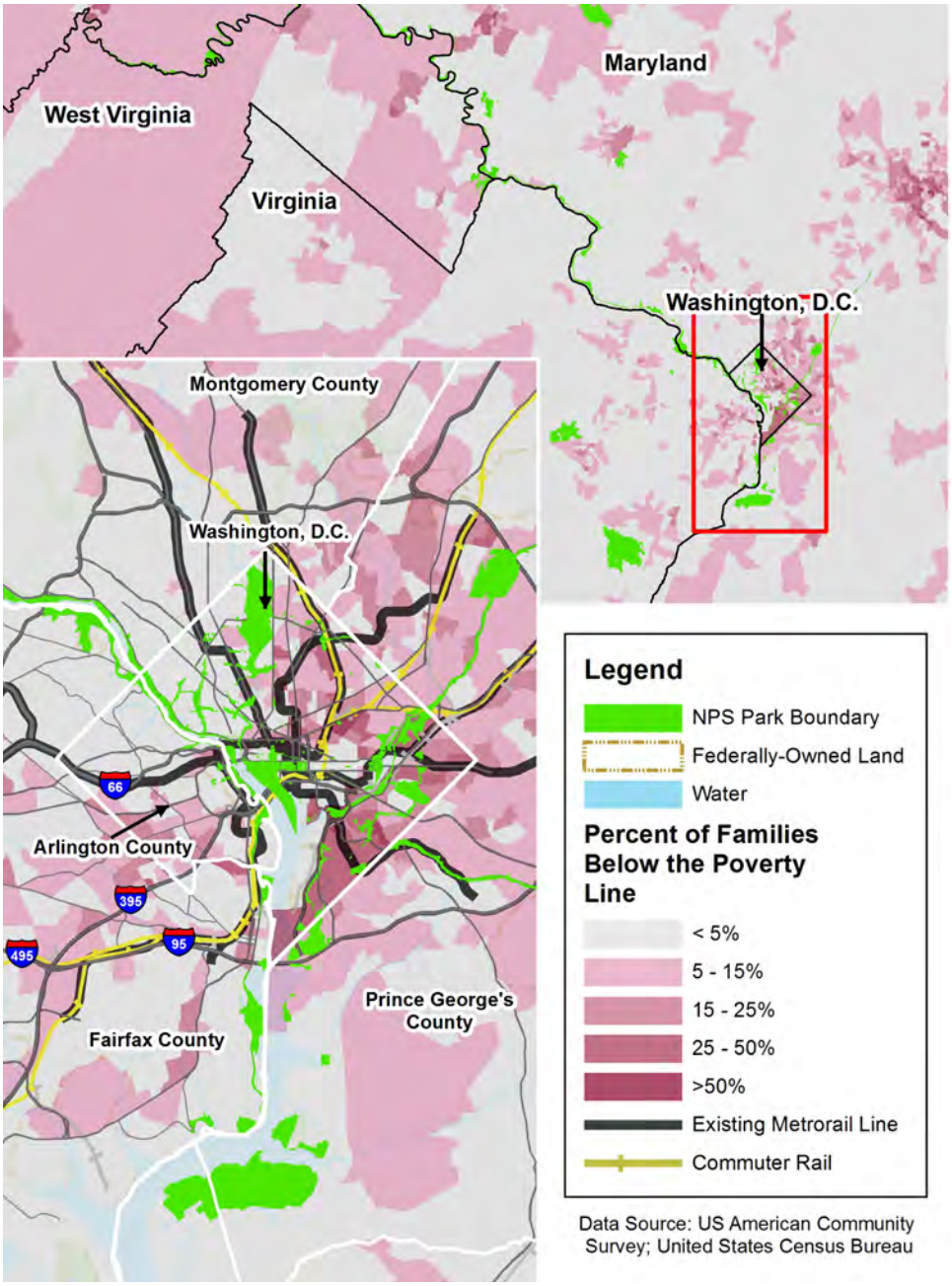


Figure 41. Percentage of Population Born Outside of the US in the National Capital Region

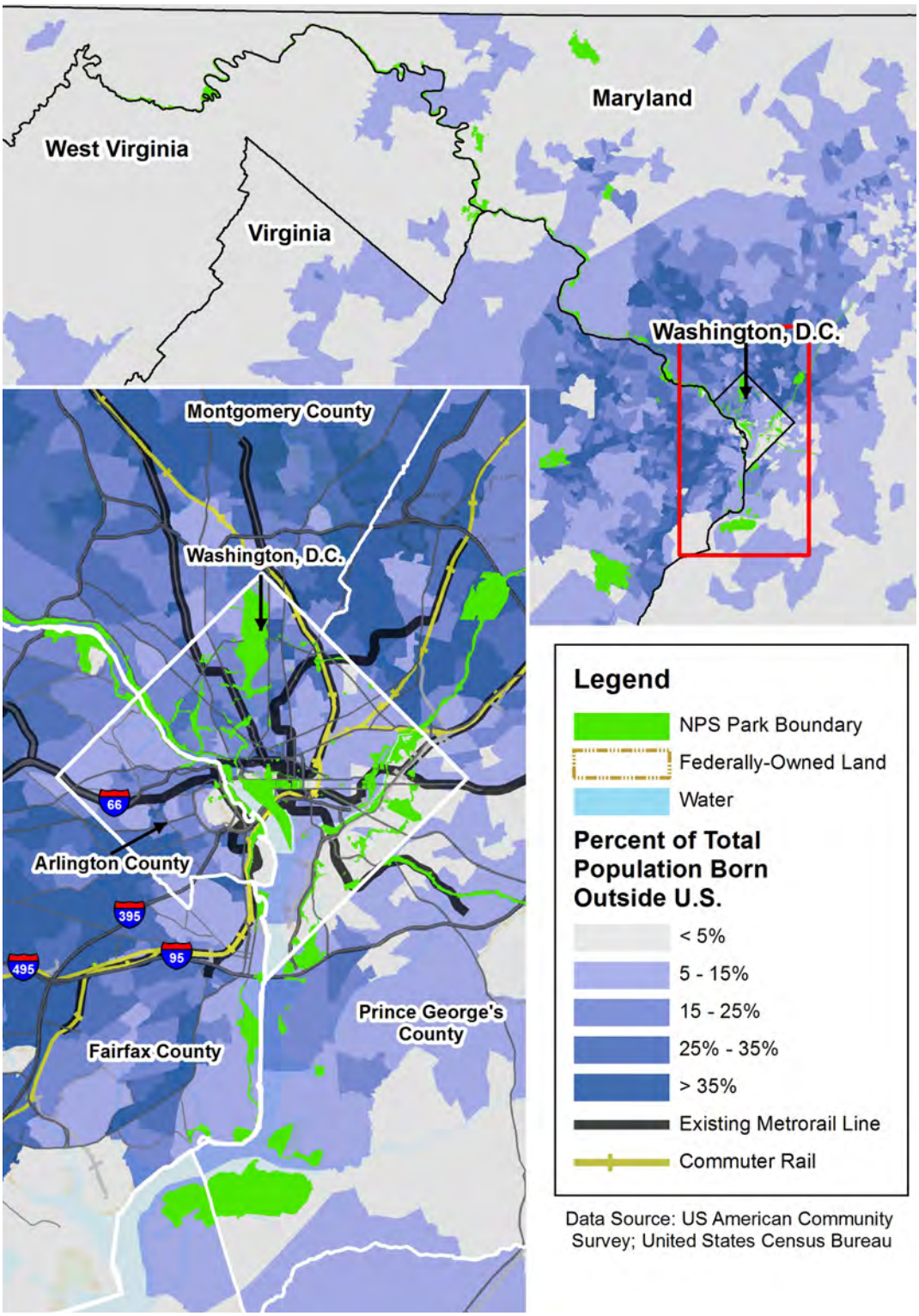
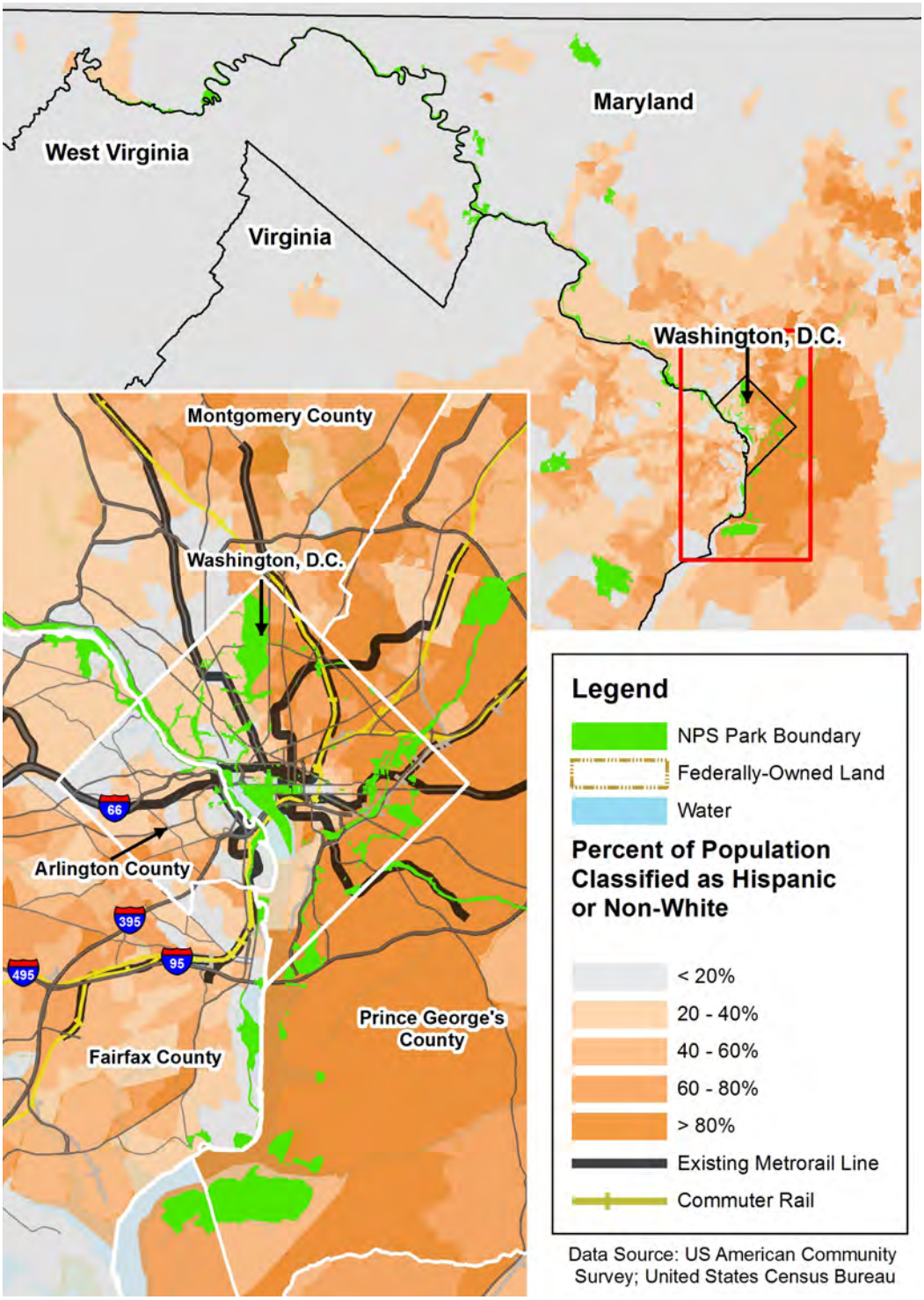


Figure 42. Percentage of Population Classified as Hispanic or Non-White in the National Capital Region



Congestion

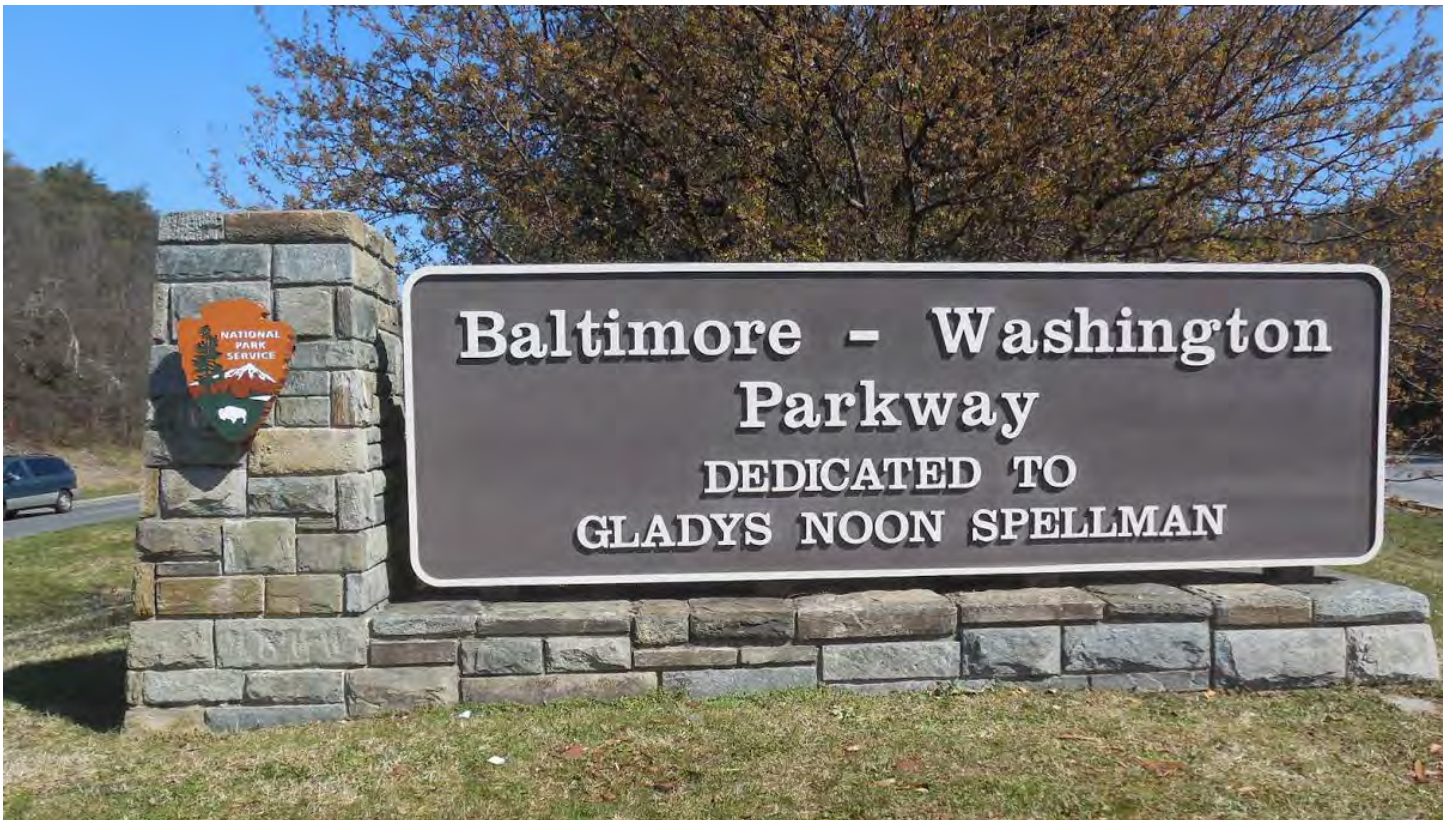
With an increase in the number of visitors to the region comes an increase in park visitation and associated congestion, particularly at parking facilities. Daily roadway congestion reduces the number of visitors who can access certain park units and affects their visitor experience. This also poses safety and emergency management concerns. Furthermore, special events, which are frequent in the region, can lead to visitor volumes that exceed transportation system capacity in many park units in the central city.

Facilities in the National Capital Region

There are two distinct types of roadways in the NCR parks that are used for very different purposes—the parkways and traditional park roads. The parkways provide a unique challenge in comparison to the traditional park roads in NCR parks, as the volume and speed of traffic on parkways is much higher.

The four main parkways studied were the Baltimore-Washington Parkway, the Suitland Parkway, the George Washington Memorial Parkway, and the Rock Creek and Potomac Parkway. The other parkways and roads are much smaller and congestion data is not readily available; however, congestion also was measured near the park entrances. Appendix E shows the results of the analysis related to congestion performance in the National Capital Region. The metrics applied to understand congestion-related issues included vehicle miles traveled, vehicle hours traveled, total travel delay, and volume/capacity ratio.

Baltimore-Washington Parkway



Existing Congestion

The metropolitan Washington region experiences congestion at a comparable level to other major metropolitan areas. According to the *2015 Urban Mobility Scorecard* published by the Texas Transportation Institute, a commonly referenced source for congestion information, the Washington, DC, region ranks #1 in terms of yearly delay per auto commuter compared with 15 other large regions.[15] The parks and parkways in the region are affected to varying degrees by these conditions. The NPS parkways all serve as primary commuting routes and experience congestion comparable to other commuting corridors within the region. Overall, the traditional NPS park roads experience congested conditions far less frequently than other facilities in the region; however, access to these facilities is often constrained during peak periods due to congestion on other public roads.

Of the parkways, the Baltimore-Washington Parkway is the most congested in both the morning and afternoon periods and from a daily perspective. The entirety of the GWMP has moderate congestion, mostly in the afternoon peak period. Rock Creek and Potomac Parkway experiences congestion primarily north of P Street, skewing the overall corridor congestion slightly; south of P Street congestion is minimal, even during the peak periods. The Suitland Parkway is much less congested than the other facilities, operating at near free-flow speeds most of the time.

For the other parks, the biggest source of congestion is the nearby bridges over the Potomac and Anacostia Rivers which serve as major regional bottlenecks. Most park roads and park entrances are relatively uncongested when compared to other roadways in the area, except in the urban core, where all roadways passing through NAMA sites experience congestion during multiple times on weekdays and weekends.

Recommended Strategies

- Support the development and use of the NPS National Congestion Management System.[16]
- Collaborate with partners to tie in NCR park units to existing regional physical and technological infrastructure through symbiotic sharing of traveler information such as park-specific conditions and major transportation data.
- Collaborate with partners on a regional bus management plan to establish strategies for mitigating congestion associated with multiple types of buses, including commuter, circulator, and sightseeing buses.

15 2015 Urban Mobility Scorecard. http://d2dtl5nnlpfr0r.cloudfront.net/tti.tamu.edu/documents/mobility-scorecard-2015.pdf

16 https://www.nps.gov/transportation/pdfs/NPS-CMS_Toolkit.pdf

Accommodation of Transportation Technological Changes

As transportation technology continues to advance, the introduction of intelligent transportation systems, mobile applications, and autonomous vehicles presents new opportunities in the improvement of NPS transportation assets. Integrating these technological changes in a way that is sensitive to park resources and management constraints will likely be an emerging issue as these technologies become more prevalent in the transportation industry.

Recommended Strategies

- Seek opportunities to participate in conversations with local, regional, and federal partners regarding transportation technological changes, such as the rise of TNCs and CV/AV, that may be leveraged to improve visitor experience.
- Establish policies that allow for ease in adopting new transportation technologies to be flexible and adapt to dynamic changes in the industry.

Changes in Transportation Culture

In many park units in the National Capital Region, particularly parkways, traveling along the roads themselves via bike, bus, or personal vehicle is one of the park's primary visitor experiences. However, with a new generation of park visitors come changes in transportation norms and expectations. As more and more people prefer to take advantage of multimodal transportation services as opposed to owning vehicles, different facilities must be considered to accommodate different visitor transportation mechanisms (e.g., cars, bicycles, motorcycles, tour buses, motorhomes, etc.) on the same stretch of road during peak use times. Balancing the needs of bicycles, cars, and motorcycles presents significant challenges to park managers from both safety and visitor experience perspectives. Considering the popularity of the Washington, DC, area as an international destination, park units also must accommodate international visitors who may or may not be familiar with US transportation practices.

Recommended Strategy

- Expand partnerships with the region's transit, bikesharing, and TNCs to educate visitors about multimodal access to the NCR park units, and to identify opportunities to enhance current services and wayfinding signage.

Measuring System Performance

Travel Information Accessibility

Visitor satisfaction is increased when visitors' expectations are met. Providing detailed information about the transportation system and a description of the transportation experiences at a park unit can help establish accurate expectations. A review of the "Plan Your Visit" portion of the 60 NCR unit websites indicates that park units do not currently provide the level of comprehensive traveler information recommended. Ensuring that all NCR park units provide essential traveler information is an essential milestone in achieving the objective of providing state-of-the-art traveler information.

Performance Measure — Percentage of park unit websites that provide essential travel information

Baseline

Percent of park unit "Plan Your Visit" webpages that provide essential travel information as of April 2017 are shown in Table 23.

Table 23. Essential Travel Information Provided by NCR Park Units

Information	Current Status of NCR Park Units
Description of the Transportation Experience	72%
Driving Directions	97%
Alternative Transportation Information	75%
Bike and Pedestrian Information	58%
Parking Information	28%
Congestion Information	8%
Travel Distances and Times to and Within the Unit	11%
Accessibility of Transportation Systems	50%
Alternative Fueling Stations	3%

Five-Year Target

Develop supplemental guidance for essential travel information on regional park websites; 100% of park units will be expected to provide essential traveler information on the "Plan Your Visit" webpage by 2019.

NPS National Mall Mobile Application

Congestion Management System

Access to NPS park units in the National Capital Region and overall visitor experience is affected by congested roadways during commute hours, special events, and weekend tourist travel. Identifying and studying the top bottlenecks on NPS-owned roads can lead to the identification of mobility strategies, congestion mitigation projects, or alternative transportation options to enhance access to the parks. The MWCOG Congestion Management Process Technical Report (2016) is a resource that provides data on current transportation system performance in the region, identifies problematic locations, and offers solutions.

Performance Measure — Completion of congestion studies and implementation of mitigations at key locations

Baseline

Not applicable

Five-Year Target

Conduct a regionwide assessment of congestion issues and needs.

Transit Access to Parks

Although the majority of NCR park units are located within a close proximity to a variety of transit facilities, several sites currently face the challenge of connecting to the park unit from the terminus of the transit service. A quarter mile is the distance that transit planners use for the distance most people are generally willing to walk to/from a bus stop (can be extended to a half-mile for rail). This would include, for example, connections between the nearest bus stop and the park entrance or connections between state- or locally-maintained trails and NPS trails. Adequate pedestrian and bicycling facilities are two critical components of ensuring proper connectivity between parks and transit locations. Limited last-mile connectivity restricts the ability of visitors to access NPS units without the use of a personal vehicle.

Performance Measure — Number of projects that fill last-mile connectivity gaps

Baseline

Not applicable

Five-Year Target

Map and prioritize gaps in transit access to parks.

Mount Vernon Trail

Chapter 7. Safety and Security

National Capital Region Long Range Transportation Plan

Goal Statement

Enhance the safety of transportation system users and provide a transportation system that is resilient to human-made hazards.

Objectives

- Reduce fatalities and serious injuries related to transportation
- Maximize safety while minimizing impacts to park resources and values
- Balance security needs with resource protection and with the NPS mission
- Maintain operational and emergency access
- Institute a comprehensive, performance-based transportation safety program that addresses the "Four E's" of transportation safety—Engineering, Education, Enforcement, and Emergency Response
- Expand strategic and operational multiagency partnerships (e.g., Coordinated Highways Action Response Team) with law enforcement and other safety stakeholders to address crashes and security concerns
- Increase staffing and available resources to assist the United States Park Police (USPP) with their ability to prevent and respond to crashes

Introduction

The NPS roadway network in the National Capital Region offers a unique environment. The NCR road system serves recreational and visitor traffic to and from the parks, but the roads also are used as major commuter routes. The roadway network has unique requirements for design and operations, which are meant to complement the natural and cultural resources that surround them, while being cognizant of safety needs.

From 1990 through 2005, motor vehicle crashes were the second-leading cause of death across all NPS parks. The National Capital Region accounted for 38% of all crashes occurring across the NPS system, 18% more than the next-highest NPS region (Intermountain Region). This statistic highlights one of the primary differences between the National Capital Region and other NPS park units. The National Capital Region is unique in that park roads service commuter and regional traffic for the Washington, DC, metropolitan area. The National Capital Region's traffic patterns are not the only difference—the metropolitan setting requires the National Capital Region to consider security and emergency response needs in coordination with transportation, enforcement, and emergency responders from several jurisdictions. This chapter presents an analysis of crash data from 2005 through 2014 to define some of the major traffic safety concerns in the National Capital Region and opportunities to improve safety in NPS parks.

Chesapeake and Ohio Canal National Historical Park

Baseline Conditions and Trends

Crash Data – Availability and Gaps

The National Park Service has been collecting crash records to assist in managing roadway safety for decades. The Traffic Accident Reporter database contains all records reported by individual park units from 2005 through 2012. Since 2013, the DOI's Incident Management and Reporting System (IMARS) has been used to record crash information. IMARS is a relatively new reporting system and is used to track incidents involving any law enforcement agency within the DOI, including vehicle accidents reported by the USPP. However, IMARS is primarily a tool used by law enforcement officers to track USPP involvement and efforts—not a transportation safety tool. For this reason, the Traffic Accident Reporter extracts salient crash data from IMARS for subsequent transportation safety analysis. The final dataset used for this analysis encompassed crash data from 2005 through 2014 and contains records for 18 of the 69 NCR park units[1] in which a crash was reported. The basis for all crash records is the United States DOI National Park Service Motor Vehicle Traffic Accident Report Form 10-413R. All data aggregated through the Traffic Accident Reporter corresponds with information gleaned from the accident report form.

NPS units across the country work alongside other regional, local, and state law enforcement agencies in cooperative, multijurisdictional policing efforts. In the National Capital Region, jurisdictional issues are exacerbated due to the high number of law enforcement agencies in and around the region. Several of the parks are serviced by roads in Maryland, Virginia, and Washington, DC. While the USPP maintains jurisdiction in NPS park units, there are dozens of local, state, and other federal agencies enforcing roadway safety laws in similar areas. As a result, crashes on NPS roads may be underreported if an agency other than the USPP responds to a crash.

Motor Vehicle Crash Trends in the National Capital Region

Between 2005 and 2014, 19,291 total crashes, including 4,489 severe crashes, were reported in the National Capital Region (across the 18 parks with crash data). Total crashes are defined as the number of all traffic crash incidents, not the number of people involved. Severe crashes are those incidents that result in a serious injury or fatality. The total crashes were classified as follows:

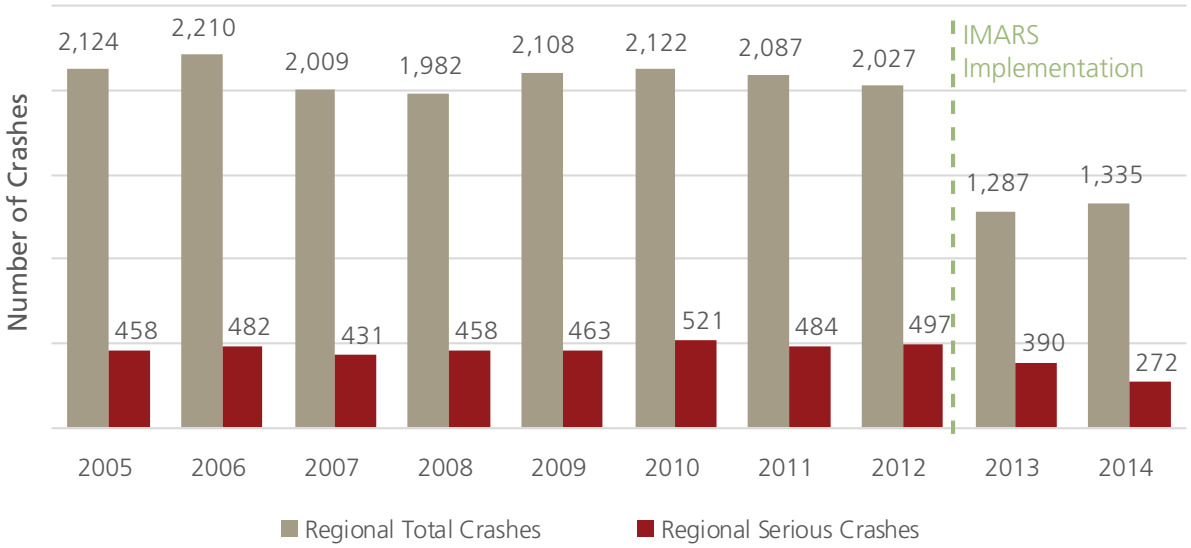
- Fatal — 75 crashes (82 people killed)
- Serious Injury — 4,414 crashes (6,357 people injured)
- Property Damage Only — 14,835 with no reported injuries or fatalities

Multivehicle crashes accounted for 73% of all severe crashes occurring in the National Capital Region. The number of total crashes and the number of severe crashes remained relatively consistent from 2005 through 2012, while in 2013 and 2014 there was a significant decrease (Figure 43). It is notable that 2013 marked the Department of Interior's change to IMARS from the previously employed Servicewide Traffic Accident Reporting System (STARS) system.

1 Table 24 lists the NCR park units where crash data was analyzed.

Figure 43. Number of Total Crashes and Severe Crashes in the National Capital Region (2005–2014)

Source: STARS and IMARS databases, accessed 2016



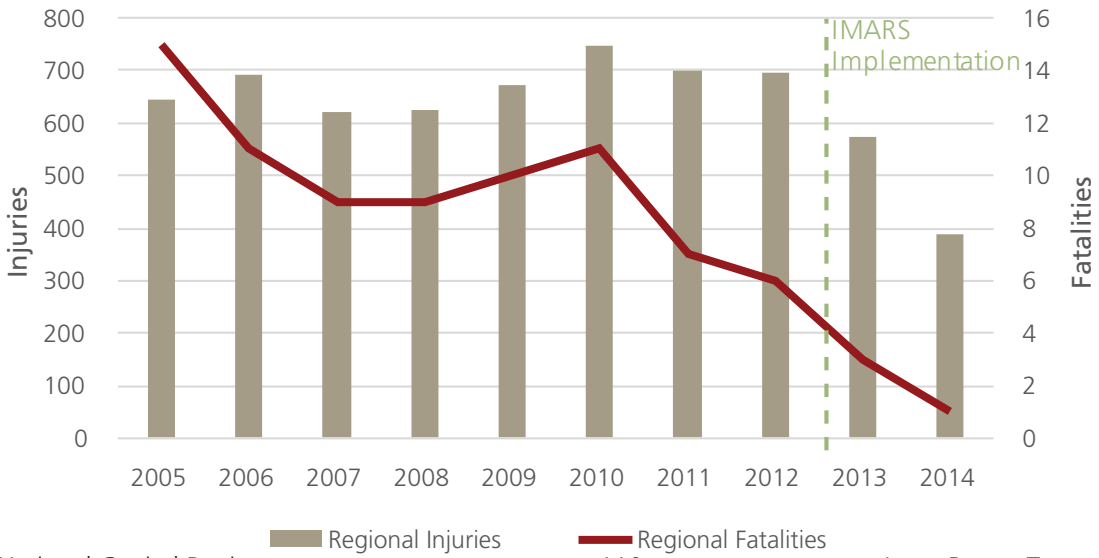
Motor Vehicle Fatality and Serious Injury Trends in the National Capital Region

Severe crashes, categorized as either resulting in a serious injury or fatality, have accounted for roughly a fifth of total crashes during the past several years but represent a much larger issue to society in terms of cost, delay, and public perception of safety. As such, the number of individual injuries and fatalities, not just the number of crashes, is a key factor for the region's transportation safety.

The yearly trends of injuries and fatalities across the National Capital Region are shown in Figure 44. The overall trend of injuries and fatalities followed the trend of overall crashes, with total injuries hitting 10-year low marks in 2013 and 2014. Due to the change in reporting systems, these apparent reductions must be further analyzed to determine if the improvements are a byproduct of the change in reporting system, or if these are real reductions.

Figure 44. Fatalities and Injuries (2005–2014)

Source: STARS and IMARS databases, accessed 2016



Crashes in the National Capital Region by Park Unit

Between 2005 and 2014, the National Capital Region accounted for 38% of all reported crashes across the entire NPS system, making it the highest-ranking region for total crashes amongst all NPS regions. The crashes are not evenly dispersed across the park units, with more than 61% of total crashes and more than 66% of severe crashes occurring on the Baltimore-Washington Parkway (BAWA) and the George Washington Memorial Parkway (GWMP). These parkways are atypical for NPS roads, with high volumes of average daily traffic and a significant portion of commuter traffic. More than 95% of total and severe crashes in the region occurred within just five parks—the BAWA, the GWMP, the National Mall and Memorial Parks (NAMA) unit cluster, the Suitland Parkway, and Rock Creek Park (ROCR) (Table 24).

Table 24. Total Regional Crashes and Severe Regional Crashes by Park Unit (2005–2014)

Note: National Capital Parks – Central is now known as NAMA, but at the time of reporting, the data were coded for National Capital Parks – Central.

Source: STARS and IMARS databases, accessed 2016

Park Unit	Percent of Regional Total Crashes	Percent of Regional Severe Crashes
Baltimore-Washington Parkway	33.98%	44.79%
George Washington Memorial Parkway	27.10%	21.77%
National Mall and Memorial Parks	21.29%	15.04%
Suitland Parkway	7.30%	8.89%
Rock Creek Park	7.27%	7.63%
National Capital Parks – East	1.15%	0.76%
All other parks (individually less than 1% of total crashes)	1.17%	0.52%

Rock Creek and Potomac Parkway

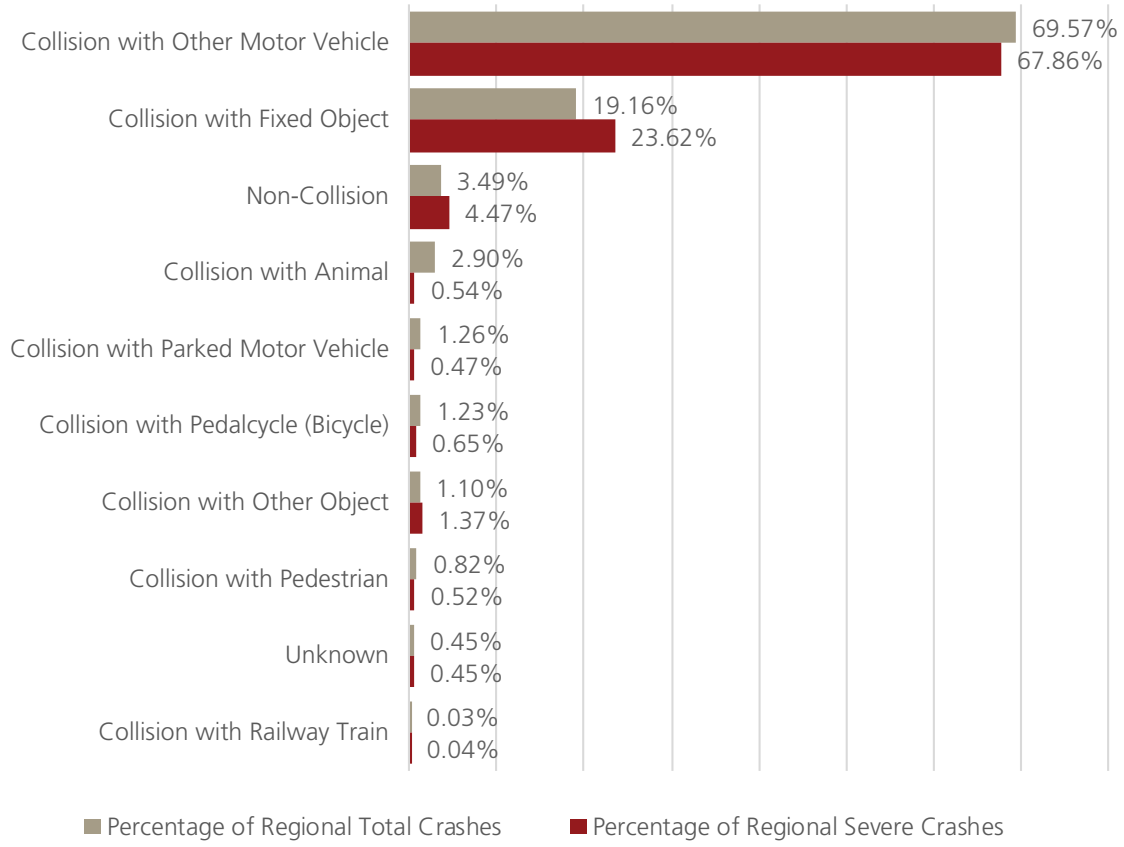
Crash Collision Types in the National Capital Region

The overwhelming majority of crashes in the National Capital Region are collisions with other motor vehicles or multivehicle crashes (Figure 45). These crashes accounted for nearly 70% of all crashes and more than 67% of severe crashes. The next highest-category for both total and severe crashes is crashes that involve vehicles impacting roadside fixed objects, such as trees or guardrails. The percentage of severe crashes with fixed objects is roughly 4% higher than the percentage of total crashes (23.6% versus 19.2%), indicating that these crashes are potentially more dangerous than other crash types. Together, collisions with other vehicles and collisions with fixed objects account for more than 95% of severe crashes and more than 88% of total crashes.

Figure 45. NCR Crashes by Collision Type (2005–2014)

Source: STARS and IMARS databases, accessed 2016

Note: Non-Collision refers to non-contact roadway departure crashes (where a car runs off the road but does not strike an object or overturn).



Multivehicle Crash Angle Type

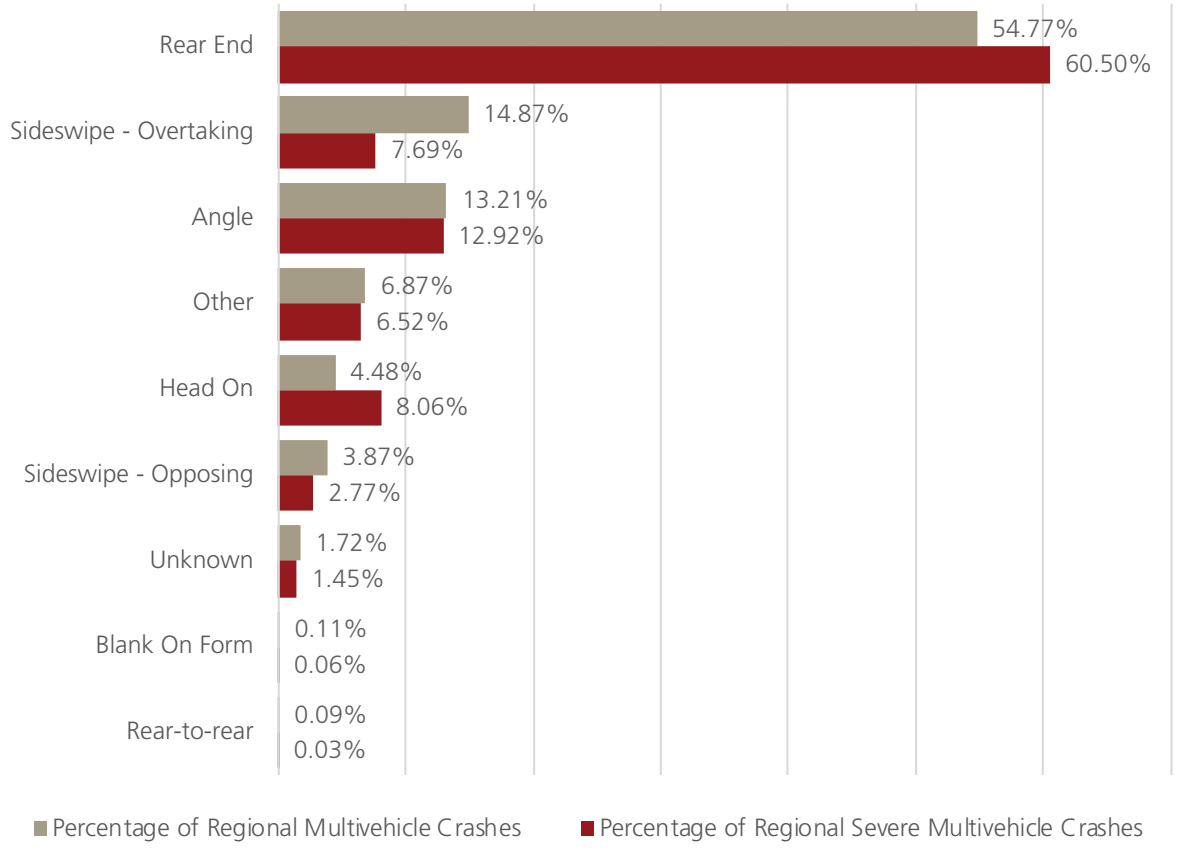
Multivehicle crashes accounted for the overwhelming majority of both total crashes and severe crashes in the National Capital Region. Within multivehicle crashes, crash angle types are critical in determining the traffic patterns and design features that may pose a greater risk to travelers. Figure 46 shows that rear-end crash angles are the most common type of crash, accounting for nearly 55% of total crashes and more than 60% of severe crashes. Further analysis indicates the top causes of rear-end crashes in the National Capital Region are distracted driving and following too closely.

The second-leading crash type is sideswipe-overtaking, which is a sideswipe where both vehicles are heading in the same direction. The dynamics of a crash like this generally are lower in impact and energy transfer than those associated with rear-end collisions. While sideswipe-overtaking crashes account for nearly 15% of total crashes, they account for only 7.5% of severe crashes.

As opposed to lower-impact sideswipe crashes, head-on crashes are more destructive, given the rapid change in momentum for both vehicles involved. Head-on crashes only accounted for about 4% of total crashes but accounted for 8% of severe crashes. This is more concerning than angle and other crash types, as the large difference in these percentages indicates head-on crashes have a higher risk of resulting in a severe crash.

Figure 46. Multivehicle Total and Severe Crashes by Crash Angle (2005–2014)

Source: STARS and IMARS databases, accessed 2016

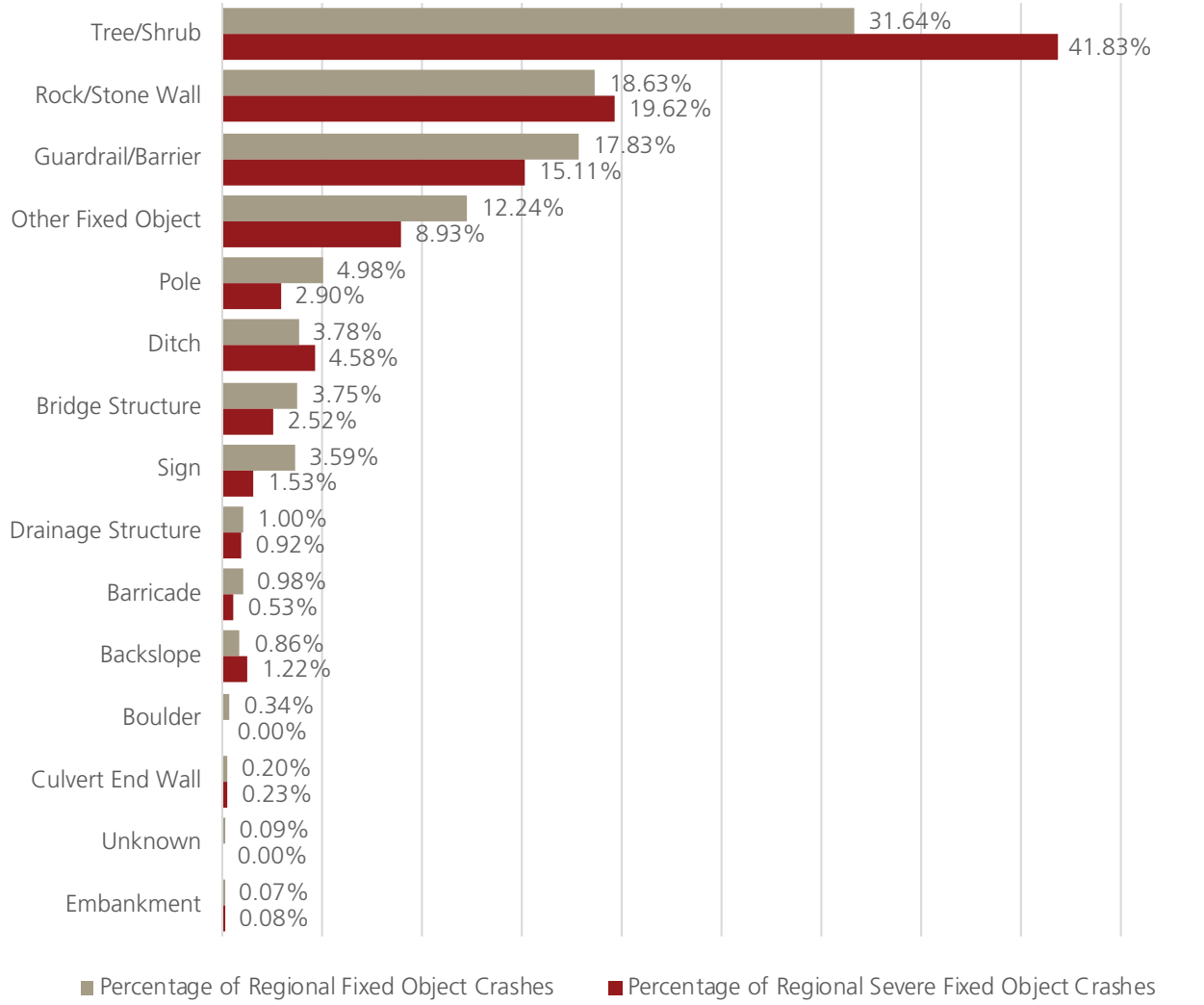


Fixed-Object Collision Type

Fixed-object collisions (Figure 47) accounted for the second-largest share of both total crashes and severe crashes in the National Capital Region. For this type of crash, the type of object hit has a significant impact on the outcome of the crash. Trees/shrubs and rock/stone walls are the top two types of fixed objects struck, accounting for more than 50% of total fixed-object crashes and more than 60% of severe fixed-object crashes. This type of crash tends to result in more fatalities and serious injuries due to the impact caused at collision. Guardrails and barriers accounted for the third-highest percentage of fixed objects hit; however, these objects are intended to reduce the chances of a more severe crash. Additional types of fixed objects leading to crashes may indicate the need for roadside improvements to reduce roadway departure or protect vehicles that have left the roadway.

Figure 47. NCR Percentages of Total and Severe Crashes by Fixed Object Hit (2005–2014)

Source: STARS and IMARS databases, accessed 2016



Vulnerable Road Users

Vulnerable road users (i.e., pedestrians and cyclists) account for 2% of total crashes but are particularly prevalent in the National Capital Region due to the large number of tourists and residents who walk and bicycle in the Washington, DC, metropolitan area, especially on the National Mall. While the occurrences of pedestrian and bicycle injuries and fatalities may be few, they are still notable. From 2005 through 2014, there were pedestrian or bicycle injuries or fatalities in nine parks in the National Capital Region. Table 25 shows that 87 of the 145 total bicycle injuries in the region occurred in the National Capital Parks – Central unit (now NAMA). This area covers most of the central part of Washington, DC, an area with a mix of park visitor and commuter bicycle traffic. While the total number of pedestrian fatalities was only 11 during the 10-year period, it is notable that six of these fatalities occurred along the BAWA, with three other fatalities being recorded on the Suitland Parkway.

Table 25. Total Pedestrian and Bicycle Injuries and Fatalities by Park Unit (2005–2014)

Source: STARS and IMARS databases, accessed 2016

Note: National Capital Parks – Central is now known as NAMA, but at the time of reporting, the data were coded for National Capital Parks – Central.

Park Unit	Pedestrian Fatalities	Pedestrian Injuries	Bicycle Fatalities	Bicycle Injuries	Total Pedestrian and Bicycle Fatalities and Injuries
National Mall and Memorial Parks	1	2	1	87	91
George Washington Memorial Parkway	0	0	0	29	29
Rock Creek Park	0	0	0	21	21
Baltimore-Washington Parkway	6	0	0	5	11
The White House and President's Park	0	0	0	1	1
Suitland Parkway	3	0	0	1	4
National Capital Parks – East	0	0	0	1	1
Greenbelt Park	1	0	0	0	1
Total	**11**	**2**	**1**	**145**	**159**

Law Enforcement Challenges

There are numerous challenges to policing the different parks in the National Capital Region. There are five different USPP policing jurisdictions (districts) in the National Capital Region and the parks included in each district. The districts themselves are quite different, with some USPP districts facing issues such as speeding, a range of crash types, and high commuter volumes, while others, such as District 2, patrol low-volume roadways. In addition to differences among districts, there are many law enforcement agencies working in the region. The dispersed nature of NCR park units requires USPP to coordinate with dozens of other local, state, and federal law enforcement agencies on a wide variety of safety issues, including traffic safety. Lastly, USPP also faces funding, resource, and staffing challenges.

Roadway Safety Design

Roadway design is critical to driver safety. Park road designs are subject to NPS park road standards, which are adaptable to each park's unique character and resource limitations.[2] Park road standards are generally consistent with FHWA design standards, but some existing roads do not meet current engineering standards. These roads may incorporate important cultural or natural resources that would be threatened by a standard engineering approach, or the roadways may be cultural resources themselves. Several examples exist in the NPS parkways and road systems where management decisions regarding lighting, width of roads, guardrails, and types of guardrails may deviate from industry standards to protect park resources. When design exceptions are made for context, safety risks are often mitigated through non-engineered strategies, such as lower speed limits, nighttime driving restrictions, or increased law enforcement.

Rock Creek Park

2 NPS 1984 Road Standards, NPS Management Policies 2006, section 9.2.1.1; Director's Order 87A: Park Roads and Parkways.

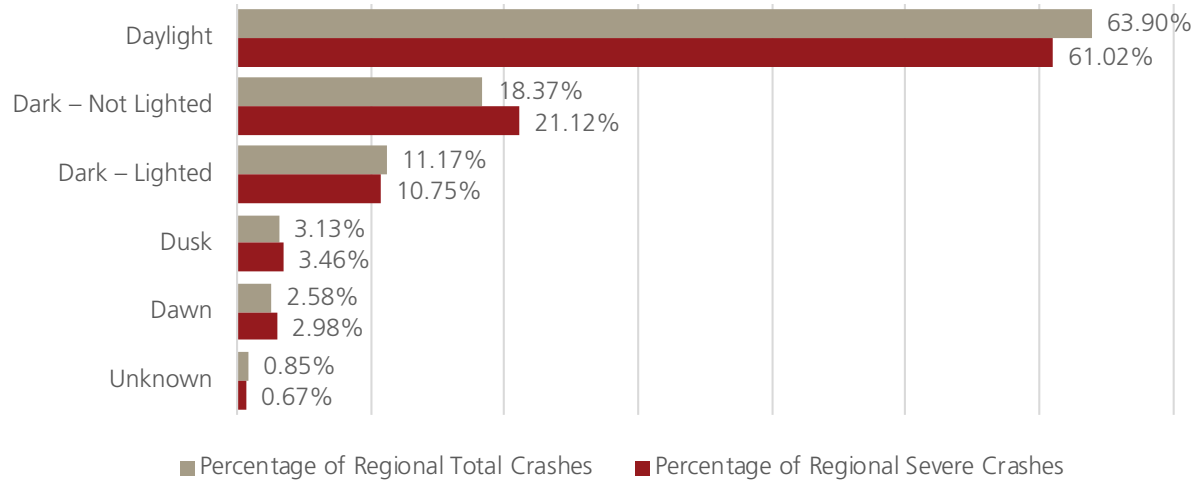
Signing and Lighting

Proper signing and lighting allow drivers to understand the road ahead of them and better detect obstacles, including animals, other vehicles, and pedestrians. Upgraded and newly implemented signing and lighting are among the most cost-effective and frequently used countermeasures to reduce crashes and improve safety across the country. According to the Crash Modification Factor Clearinghouse, simply upgrading the retroreflectivity of a stop sign can reduce rear-end crashes by 17.5%.[3] In the National Capital Region, signs are the most frequently used method of communicating with park visitors and are an important part of the NPS identity. Each park has an approved parkwide sign plan based on servicewide design criteria and tailored to meet individual park needs. Traffic signs and pavement marking on park roads are consistent with standards set by the Federal Highway Administration (*FHWA) Manual on Uniform Traffic Control Devices*, as supplemented by the *NPS Sign Manual*.

The National Park Service preserves, to the greatest extent possible, the natural lightscapes of parks. Artificial lighting along transportation corridors is used in areas where security, basic human safety, and specific cultural resource requirements must be met. Use of artificial lighting in response to specific circumstances is left to the discretion of park superintendents and decided through a planning process. While specific park superintendents determine the use of artificial lighting, the unique needs and challenges of the National Capital Region make this planning process an impactful decision. Figure 48 shows more than 20% of severe crashes occurred in "Dark – Not Lighted" conditions, while only approximately 11% of severe crashes occurred in "Dark – Lighted" conditions.

Figure 48. Percentages of Total Crashes and Severe Crashes by Lighting Condition (2005–2014)

Source: STARS and IMARS databases, accessed 2016



3 Safety Evaluation of Increasing Retroreflectivity of STOP Signs, Persuad et al. (12/2007). Accessed from: http://www.cmfclearinghouse.org/study_detail.cfm?stid=388

Regional Issues and Opportunities

Safety

Safety for all visitors and users of the parks in the National Capital Region is one of the most critical concerns for regional staff. Parkways have higher crash frequencies than other facilities in the National Capital Region. For a typical agency, adequately managing safety issues (e.g., speed, aggressive driving) with limited enforcement, maintaining facilities, and complying with the federal standards is a complicated task. The National Park Service has to contend with these issues and more, but still emphasizes the safety of roadway users. While most park roads are generally consistent with FHWA design standards, some existing roads have been granted variances from current engineering standards because they include important cultural or natural resources that would be threatened by a standard engineering approach. Consequently, the need to protect resources while maintaining a safe experience for visitors is a delicate balance for many NCR transportation facilities.

Recommended Strategies

- Facilitate conversations with state Department of Transportation partners to leverage non-NPS resources for safety-related improvements on the parkways.
- Explore the concept of a rapid-response team to fix infrastructure improvements that would have an impact on vehicle, pedestrian, and bicycle safety.
- Educate NPS parkway users on the original design and purpose of the roadway system and the safety implications of speeding.
- Encourage complete and consistent collection of crash records to enhance location, persons, and vehicle data.
- Initiate safety planning activities on major thoroughfares to implement appropriate multimodal safety countermeasures.
- Employ the Safety Management System when available.
- Establish processes and/or tools that facilitate early and continuous consultation with resource protection and visitation experts during transportation safety planning, programming, and project development.

Law Enforcement

Law enforcement is integral to overall visitor safety but can be a challenge in the National Capital Region. The main challenges related to law enforcement are the lack of enforcement resources, such as radar guns, automated enforcement, staging areas, and jurisdictional complexities. Multiple entities, including USPP, rangers, and local law enforcement have jurisdiction over various park areas. Due in part to the number of agencies involved, collaboration and operational cooperation can be difficult, but is especially critical in the event of an emergency such as an evacuation or a major severe weather event.

Recommended Strategies

- Enhance USPP coordination with local law enforcement agencies to improve crash reporting accuracy, assess jurisdictional boundary issues, and leverage enforcement resources.
- Explore partnerships with regional transportation and enforcement agencies to leverage traffic incident management tools and technology to improve response time and reduce the impacts of crashes on NPS parkway operations.

Washington Monument

Measuring System Performance

Safety Management Systems

Completion of the transportation safety management system is an essential milestone in the implementation of the National Park Service's new performance-based approach to transportation safety. This implementation relies, at least partially, on the continued development of the Department of the Interior IMARS. The National Capital Region relies upon the IMARS to conduct crash analysis and supports the updating of the system. Regional efforts will focus on supporting national efforts to complete the safety management system, providing data, and acting on the resulting safety audits. Safety audits look for safety hot spots, trends, and probable fixes.

Performance Measure — Support and adopt transportation safety management system components

Baseline

The region is providing data to the developing system and using the results of safety audits to identify safety solutions in the near term.

Five-Year Target

Safety management system components completed and fully operational by 2020. Partner with local and regional transportation and safety stakeholders to conduct at least three road safety audits by 2020.

Crash Statistic Reporting

The USPP document traffic incidents in a crash report form, which is recorded and reported in the IMARS. Documentation of all crashes, regardless of severity level, and completion of all the relevant fields in the crash report form provide end-users with information on the crash itself, the vehicles involved, and the people involved.

Performance Measure — Percent of park units recording crash statistics

Baseline

The final crash data set that is currently available only encompasses crash data from 2005 through 2014 and contains records for only 18 of the 54 NPS park units within the National Capital Region in which a crash was reported.

Five-Year Target

Identify the NCR park units that should be reporting crashes to the IMARS and increase crash reporting for all applicable units.

Crash Reduction

The USPP capture data on all transportation-related crashes, including whether the incident is a fatality or a serious injury. Information on the magnitude as well as the severity of crashes informs resource allocation toward the most-effective safety programs and projects.

Performance Measure — Reduce the number of severe automobile crashes as well as crash rates as a whole

Baseline

- 2014 crash data (annual) and 2010–2014 (five-year rolling average)
  - Fatalities: One (annual); six (5-year rolling average)
  - Serious injuries: 389 (annual); 621 (five-year rolling average)
  - Bicycle and pedestrian combined fatalities and serious injuries: 16 (annual); 18 (five-year rolling average)

Five-Year Target

Collect vehicle miles traveled data for functional classification 1 and 7 roads and establish a baseline for crash rates for the region and all park units reporting their crashes through IMARS within two years of long range transportation plan acceptance by regional management. Use the baseline to establish a target for percent reduction in crashes over the following five years.

Crash Mitigation Efforts

Crash data captured in the IMARS enables end-users to identify high-crash locations and further investigate those sites (segments or intersections) to determine safety improvements.

Performance Measure — Number of high-crash/incident locations mitigated

Baseline

No analysis of high-crash locations exists to date.

Five-Year Target

Based on available data, review reported crashes to define and determine high-crash definitions during the next five years; identify the top five high-crash locations and subsequent safety improvements during the subsequent five-year period (years 6–10 following long range transportation plan acceptance).

Chesapeake and Ohio Canal

Conclusion

National Capital Region Long Range Transportation Plan

Moving Forward

Through this National Capital Region Long Range Transportation Plan (NCR LRTP) the National Park Service (NPS) provides a framework for moving the regional transportation system forward. Designed to shape regional transportation investments during the next 20 years, the NCR LRTP aligns transportation planning with all aspects of the NPS mission. This plan recommits the service to both protecting and providing access to the most important, unique, and special places in the region. This plan sets goals and objectives that address both traditional transportation topics such as asset management, financial sustainability, and safety, as well as additional NPS mission-focused topics, such as visitor experience and resource protection.

Transportation planning in the National Capital Region is a cooperative and continual process that does not stop with the release of this document. The region is committed to continuing the broad coordination and collaboration between the regional office and the parks it serves, as well as with the Federal Highway Administration (FHWA) and with state, local, and agency partners who contributed to the planning process. Within the region, close collaboration between fund managers is critical to identify opportunities to overlap projects and use regional funding efficiently.

The plan sets ambitious but achievable objectives to spur improvements to existing practices and embrace innovative ideas. Performance measures and targets were strategically developed to make sure they were practicable and beneficial.

The region will use this momentum to go forward and take decisive action to achieve the plan's goals and performance targets. The region will work with its parks and its partners, and with the national and other regional planning teams to support the progress of both the National Capital Region's plan and the service's overall vision outlined in the National LRTP.

Every two years, the region will monitor performance by preparing a report card indicating any change in the performance metrics identified in this plan. The report cards will aid in updating the plan as well as inform the Washington Support Office for performance

management reporting to the FHWA. The first update to the NCR LRTP is scheduled for five years from LRTP acceptance by regional management, when the region will comprehensively evaluate initial progress towards meeting the plan's goals and objectives. This update to the plan will consider new opportunities and changes brought on by the passage of any new subsequent federal surface transportation legislation. In addition, the update to the LRTP will incorporate any changes in national transportation policy or guidance as issued by the National Park Service and FHWA.

The National Capital Region is excited to embark on this journey to promote enhanced stewardship, engagement with, and enjoyment of its national parks.

Arlington Memorial Bridge and Arlington Cemetery

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Harpers Ferry National Historic Park

Antietam National Battlefield

Appendices

National Capital Region Long Range Transportation Plan

Appendix A: Summary of Goals, Objectives, and Performance Measures

See list of acronyms for definitions

Asset Management

Goal

Strategically manage, preserve, and maintain a right-sized and mission-focused portfolio of National Capital Region (NCR) transportation assets through an appropriate level of funding while sustaining long-term access to all transportation services.

Objectives

- Maintain assets at desired condition targets following the Capital Investment Strategy (CIS)
- Emphasize core capital investment strategy goals
- Incorporate asset lifecycle costs into project programming, planning, and design decisions
- Work with partners to enhance and expand multimodal transportation systems and supporting assets
- Invest in decommissioning redundant or nonessential assets
- Address the deferred maintenance backlog of road, trail, pedestrian facility, and bridge facility needs
- Address the need to remove architectural barriers for accessibility
- Complete condition assessments for trails and other multimodal transportation systems
- Incorporate the principles of resilience into the process of improving/constructing asset

Performance Measures

Number of park units that have completed a transportation infrastructure risk assessment

Baseline

- A sea level rise assessment has been completed for 21 NCR parks as of April 2017
- Exposure analysis and mapping has been completed for six NCR parks as of April 2017
- Vulnerability analyses, including structures and roads, have been completed for three NCR parks as of April 2017
- An adaptation strategies analysis has been completed for zero NCR parks as of April 2017

Five-Year Target

- Prioritize the highest-risk parks; complete risk assessment and adaptation strategy analysis for at least two of the highest-risk park units during the next five years

Condition of highest-priority transportation assets

Baseline

- Pavement Condition Rating (PCR) of 71 for highest-priority paved roads and parking lots
- Bridge Health Index (BHI) of 87.7% for highest-priority bridges
- Facility Condition Index (FCI) of 0.115 for all other highest-priority transportation assets

Five-Year Target

- PCR of 72 for highest-priority paved roads and parking lots
- BHI of 85.5% for highest-priority bridges
- FCI of 0.106 for all other highest-priority transportation assets

Paved Roads and Parking Lots (FC 1 and 7)

Bridges (All Bridges)

Other Asset Types (OB 1)

Develop bridge performance measures and targets in terms of percent good condition and percent poor condition.

Baseline

- Not applicable

Five-Year Target

- Identify performance measures

Reduction in overall management cost of transportation assets

Baseline

- Not applicable

Five-Year Target

- Create an inventory of transportation assets within five years that are evaluated for different management strategies such as abandonment, exchange, sale, or leasing

Transportation Finance

Goal

Sustainably manage an appropriate level of funding to accomplish the goals of the Long Range Transportation Plan (LRTP) and pursue other opportunities to expand funding.

Objectives

- Use full breadth of funding in a coordinated manner (including Federal Lands Transportation Program [FLTP], Federal Lands Access Program [FLAP], and other Title 23 and 54 funds)
- Seek to expand funding through partnerships or reduce costs where necessary
- Strategically use NPS money to fund NCR transportation objectives

Performance Measures

Percentage of transportation funds invested in highest-priority transportation assets

Baseline

- 80% of transportation funds invested in highest-priority assets

Five-Year Target

- 88% of transportation funds invested in highest priority assets

Percentage of park units that meet preventative maintenance targets for highest-priority transportation assets

Baseline

- Not available

Five-Year Target

- 100% of parks

Resource Protection

Goal

Incorporate the ideal of leaving park resources unimpaired into all aspects of transportation, including planning, design, construction, maintenance, operation, and disposition.

Objectives

- Maximize safety while being sensitive to fundamental park resources and values
- Remove or modify unnecessary, redundant, or underused infrastructure to restore resources and minimize maintenance costs
- Plan, construct, and operate a transportation system that minimizes impacts to resources and enhances visitor experience
- Protect and maintain cultural resources that are transportation assets

Mount Vernon Trail

Performance Measures

Develop a system for tracking and forecasting the condition of culturally significant transportation assets

Baseline

- National system is 30% complete (July 2017)

Five-Year Target

- Within two years of completion of the system at the national level, the National Capital Region will determine the baseline conditions of historic transportation assets and set a target for future conditions

Percent decrease in National Park Service (NPS) transportation system greenhouse gas emissions from baseline year

Baseline

- 2008 baseline emissions for all NCR park units under Scopes 1 and 2 emissions (17,767 metric tons of carbon dioxide equivalent [MTCO2E]) and Scope 3 emissions (1,025 MTCO2E) *(Regional Data, Source: 2008 Servicewide Inventory)*

Five-Year Target

- Reduce Scope 1 and 2 greenhouse gas emissions by 36% by 2025 from the 2008 baseline and Scope 3 emissions by 23% by 2025 from the 2008 baseline

Scope 1 and 2 (in MTCO2E)

Scope 3 (in MTCO2E)

Apply the Innovative and Sustainable Transportation Evaluation Process and Guidance (INSTEP) tool

Baseline

- INSTEP process tool has been completed and was rolled out in February 2018

Five-Year Target

- Every fund manager should use the INSTEP tool by February 2020

Visitor Experience

Goal

Provide sustainable and context-sensitive multimodal transportation systems that support the visitor experience through universally accessible and seamless connections between parks, and to and from surrounding communities.

Objectives

- Provide seamless connections for all people in and through parks/units and to surrounding communities
- Incorporate universal accessibility into project planning and design decisions
- Implement easily accessible facilities and payment options in transportation services
- Promote multimodal transportation opportunities that are efficient and easy to use
- Provide options for scenic driving experiences and access to recreation
- Develop enforcement, policy, and other ideas on the use of commercial motor vehicles and heavy vehicles on NPS roads
- Maintain critical connections and transportation services (e.g., roadways, rolling stock)
- Mitigate congestion of "view" jams to protect safety, operations, efficiency, and traffic flow

Performance Measures

Percentage of park unit websites that provide essential travel information

Baseline

- Park unit "Plan Your Visit" webpages that provide the following essential travel information as of April 2017 (Table 26)

Five-Year Target

- Develop supplemental guidance for essential travel information on regional park websites; 100% of park units will be expected to provide essential traveler information on the "Plan Your Visit" webpage by 2019

Table 26. Baseline Essential Travel Information for NCR Park Units

Component	Current Status
Description of the Transportation Experience	72% of NCR park units
Driving Directions	97% of NCR park units
Alternative Transportation Information	75% of NCR park units
Bike and Pedestrian Information	58% of NCR park units
Parking Information	28% of NCR park units
Congestion Information	8% of NCR park units
Travel Distances and Times to and Within the Unit	11% of NCR park units
Accessibility of Transportation Systems	50% of NCR park units
Alternative Fueling Stations	3% of NCR park units

Completion of congestion studies and implementation of mitigations at key locations

Baseline

- Not applicable

Five-Year Target

- Conduct a regionwide assessment of congestion issues and needs

Number of projects that fill last-mile connectivity gaps

Baseline

- Not applicable

Five-Year Target

- Map and prioritize gaps in transit access to parks

Safety and Security

Goal

Enhance the safety of transportation system users and provide a transportation system that is resilient to human-made hazards.

Objectives

- Reduce fatalities and serious injuries related to transportation
- Maximize safety while minimizing impacts to park resources and values
- Balance security needs with resource protection and with the NPS mission
- Maintain operational and emergency access
- Institute a comprehensive, performance-based transportation safety program that addresses the "Four Es" of transportation safety, which are Engineering, Education, Enforcement, and Emergency Response
- Expand strategic and operational multiagency partnerships (e.g., Coordinated Highways Action Response Team [CHART]) with law enforcement and other safety stakeholders to address crashes and security concerns
- Increase staffing and available resources to assist the United States Park Police (USPP) with their ability to prevent and respond to crashes

Beach Drive in Rock Creek Park

Performance Measures

Support and adopt transportation safety management system components

Baseline

- The region is providing data to the developing system and using the results of safety audits to identify safety solutions in the near term

Five-Year Target

- Safety management system components completed and fully operational by 2020; partner with local and regional transportation and safety stakeholders to conduct at least three road safety audits by 2020

Percent of park units recording crash statistics

Baseline

- The final crash data set that is currently available only encompasses crash data from 2005 through 2014, and contains records for only 17 of the 54 park units within the National Capital Region in which a crash was reported; between 2005 and 2014, 19,291 total crashes were reported in the National Capital Region and of those, 4,489 were severe crashes (i.e., resulted in a fatality or serious injury)

Five-Year Target

- Identify the NCR park units that should be reporting crashes to the Incident Management Reporting System and increase crash reporting for all applicable units

Reduce the number of severe automobile crashes as well as crash rates as a whole

Baseline

- 2014 crash data (annual) and 2010–2014
- Fatalities: 1 (annual); 6 (five-year rolling average)
  - Serious injuries: 389 (annual); 621 (five-year rolling average)
  - Bicycle and pedestrian combined fatalities and serious injuries: 16 (annual); 18 (five-year rolling average)

Five-Year Target

- Collect vehicle miles traveled (VMT) data for functional class 1 and class 7 roads, and establish a baseline for crash rates for the region and all park units reporting their crashes through Incident Management and Reporting System within two years of the LRTP acceptance by regional management; use the baseline to establish a target for percent reduction in crashes during the following five years

Number of high-crash/incident locations mitigated

Baseline

- No analysis of high-crash locations exists to date

Five-Year Target

- Based on available data, review reported crashes to define and determine high-crash definitions during the next five years; identify the top five high-crash locations and subsequent safety improvements during the subsequent five-year period (years 6–10 following LRTP acceptance)

Appendix B: NCR Park Unit List

Administrative Park Unit	Park Area	State
Antietam National Battlefield		MD
Chesapeake and Ohio Canal National Historical Park		MD-DC-WV
Catoctin Mountain Park		MD
Harpers Ferry National Historical Park		MD-VA-WV
Manassas National Battlefield Park		VA
Monocacy National Battlefield		MD
Potomac Heritage National Scenic Trail		DC-MD-PA-VA
Prince William Forest Park		VA
President's Park/White House		DC
Wolf Trap National Park for the Performing Arts		VA
George Washington Memorial Parkway	Arlington House, The Robert E. Lee Memorial	VA
	Arlington Ridge Park	VA
	Clara Barton National Historic Site	MD
	Claude Moore Colonial Farm	VA
	Dyke Marsh Wildlife Preserve	VA
	Fort Hunt Park	VA
	Fort Marcy	VA
	George Washington Memorial Parkway	MD-VA
	Glen Echo Park	VA
	Great Falls Park	VA
	Jones Point Park	VA
	Lady Bird Johnson Park	VA
	Lyndon Baines Johnson Memorial Grove on the Potomac	DC
	Netherlands Carillon	VA
	Theodore Roosevelt Island	DC
	Turkey Run Park	VA
	US Marien Corps War Memorial	VA
	Belle Haven Park and Marina	VA
	Daingerfield Island	VA
	Collingwood Picnic Area	VA
	Gravelly Point	VA
	Memorial Avenue / Arlington Memorial Bridge	VA
	Navy and Marine Memorial	VA
	Roaches Run Waterfowl Sanctuary	VA
	Women in Military Service for America Memorial	VA

Administrative Park Unit	Park Area	State
National Mall and Memorials Parks	56 Signers of the Declaration of Independence Memorial	DC
	African American Civil War Memorial	DC
	American Veterans Disabled for Life Memorial	DC
	Benjamin Banneker Park	DC
	Belmont-Paul Women's Equality National Monument	DC
	Constitution Gardens	DC
	District of Columbia War Memorial	DC
	Dupont Circle	DC
	East Potomac Park	DC
	Farragut Square	DC
	Franklin Delano Roosevelt Memorial	DC
	Ford's Theatre National Historic Site	DC
	Franklin Park	DC
	Franklin Delano Roosevelt Memorial	DC
	George Mason Memorial	DC
	Hispanic Heroes on Virginia Avenue, NW	DC
	Japanese American Memorial to Patriotism in World War II	DC
	Korean War Veterans Memorial	DC
	Lincoln Memorial	DC
	Logan Circle	DC
	Martin Luther King, Jr. Memorial	DC
	McPherson Square	DC
	National Law Enforcement Officers Memorial	DC
	National Mall	DC
	World War II Memorial	DC
	Old Post Office Tower	DC
	Pennsylvania Avenue National Historic Site	DC
	Thomas Jefferson Memorial	DC
	Vietnam Veterans Memorial	DC
	Washington Monument	DC
	World War I Memorial	DC
	United States Navy Memorial	DC
	West Potomac Park	DC
National Capital Parks – East	Carter G. Woodson Home National Historic Site	DC
	Frederick Douglass National Historic Site	DC
	Kenilworth Park & Aquatic Gardens	DC

Administrative Park Unit	Park Area	State
National Capital Parks – East	Oxon Run Parkway	DC
	Shepherd Parkway	DC
	Harmony Hall	MD
	Greenbelt Park	MD
	Mary McLeod Bethune Council House National Historic Site	DC
	Oxon Cove Park	DC-MD
	Oxon Hill Farm	MD
	Civil War Defense of Washington	DC-MD-VA
	Piscataway Park	MD
	Baltimore-Washington Parkway	MD
	Suitland Parkway	MD
	Anacostia Park	DC
	Capitol Hill Parks	DC
	Langston Golf Course	DC
Rock Creek Park	Rock Creek Park	DC
	Battleground National Cemetery	DC
	Chevy Chase Circle	DC
	Civil War Defenses of Washington	DC
	Old Stone House	DC
	Rock Creek & Potomac Parkway	DC
	Glover Archbold Park	DC
	Dumbarton Oaks Park	DC
	Montrose Park	DC
	Meridian Hill Park	DC
	Georgetown Waterfront Park	DC
	Kahlil Gibran Memorial	DC
	Klingle Valley Parkway	DC
	Piney Branch Parkway	DC
	Whitehaven Parkway	DC
	Rabaut Park	DC
	Soapstone Valley	DC
	Potomac Palisades Parkway	DC
	Normanstone Parkway	DC
	Pinehurst Tributary	DC
	Melvin Hazen Park	DC
	Woodley Park	DC
	Little Forest	DC
	Bryce Park	DC

Appendix C: National Capital Region Long Range Transportation Plan Superintendents' Survey Report

Introduction and Purpose

During scoping for this project, the interdisciplinary planning team identified a preliminary list of transportation related issues facing the park units in the National Capital Region. This survey was intended to provide park unit superintendents with the opportunity to provide input on these issues. A list of issues was provided in the survey for superintendents to evaluate, and a description of each issue was provided in a linked reference document to clarify any issues that might be confusing to the responder.

Superintendents at NCR parks were asked to rank issues in one of four categories:

- **Major Issue:** Major issues are those issues that consume much of the staff's time, energy, and other park resources. These issues occur often, and solutions to resolve these issues require additional planning and development.
- **Moderate Issue:** Moderate issues are those issues that occur regularly, but they are predictable and manageable. These issues may require additional funding to support the implementation of known solutions.
- **Minor Issue:** Minor issues occur infrequently and can be dealt with in regular routine maintenance.
- **Not an Issue:** Not currently an issue or not relevant to your unit.

Superintendents also were asked to identify any other major issues related to each of the goal areas that were not listed. Responses to this question within each of the goal areas are included in the results.

Additionally, superintendents were asked to identify their first and second highest-priority issues across all LRTP goal areas and provide any suggestions or considerations they had for project ranking criteria.

Overall responses were collected from superintendents from 12 units.

Analysis Methods

For comparability and analysis, each of the responses were giving a numerical ranking. This numerical ranking provides a relative "weighting" of responses. Major issues were scored as "3," moderate issues as "2," minor issues as "1," and not an issue as "0."

Two primary analyses were conducted on the data from this survey. First was an overall weighted ranking of all issues within a goal area. This analysis identified which issues were more critical, or more prevalent, throughout the region as a whole. The second analysis was a weighted ranking by cluster. This analysis allowed us to look at where issues may be more or less critical to a specific grouping of park units.

Results

Results of this survey are organized by goal area and provide results from the two analyses described previously. Most results are provided in tabular format; however, the overall weighted ranking results also are provided in graphical form so readers can see the relative contributions of each score category (major, moderate, minor) to the overall total score.

Colors are used in the display of these results to indicate high, medium, and low scoring issues. Cells colored in red/orange hues indicate many major and moderate responses, while green hue cells indicate many non-issue or minor issue responses.

The responses (presented on the following pages) represent responses from superintendents and have not been edited from the submissions.

Issue Rank	Color
High Score	
Critical issue	
Medium Score	
Low Score	
Less-critical issue	

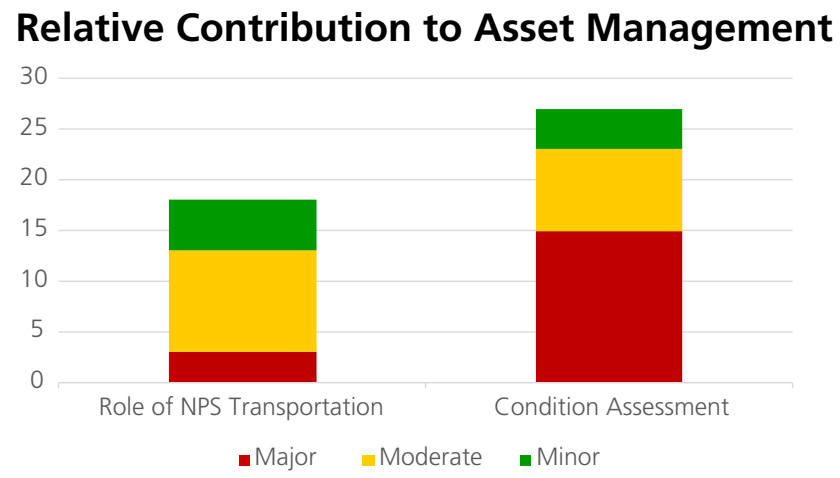
Goal Area: Safety

Overall Weighted Ranking of Safety and Security Issues

Table 27. Superintendents' Survey Safety and Security Responses

	Safety	Law Enforcement
Major	21	15
Moderate	8	6
Minor	4	6
Total	33	27

Figure 49. Superintendents' Survey Safety and Security Responses



Additional Issues Related to Safety and Security

- Ability to walk and ride safely to/from and on POHE network segments (POHE)
- An item that is related but that I am not seeing focused on is parking areas, providing enough locations and also providing security for parked cars or removal of cars that are parked in locations that they should not be (after park open hours) (PISC)
- There are policy differences between FHWA and the NPS that have caused delays in the planning effort for the rehabilitation of the North Parkway, causing road infrastructure failure and storm/runoff culverts to fail. The park receives a number complaints on potholes and roadway conditions that "band-aid" jobs cannot address. (GWMP)
- Looking for partnership opportunities at the state, county and local levels for enforcement and corridor management within constraints of federal oversight. (BAWA)
- Most sidewalks in park are multi-use trails which can result in conflicts among users (bikes, peds, segways) (NAMA)
- Heavy tour bus and sightseeing bus use can result in unsafe behaviors — unloading at areas not designated for pedestrian, congestion blocking intersections. (NAMA)
- Areas such as Lincoln Circle are not designed for the increase in bike/ped traffic resulting in unsafe behavior and conflicts between users. (NAMA)
- Areas such as Fletcher's Cove, and Great Falls Entrance road come to mind relative to the two topics noted above. (CHOH)
- Not enough resources to ensure proper enforcement of speed limit, etc. on roadways. (NACE)
- Degradation of infrastructure (ex. potholes, de-lamination of surface, wearing off of line paint) all create safety issues for drivers on the roadway. (NACE)
- Snow removal operations are often lacking in proper equipment and personnel, creating safety concerns for drivers on the roads during an event as well as safety concerns for staff performing snow removal operations. (NACE)
- Employee safety - park staff and contractors working in and alongside roads. (ROCR)

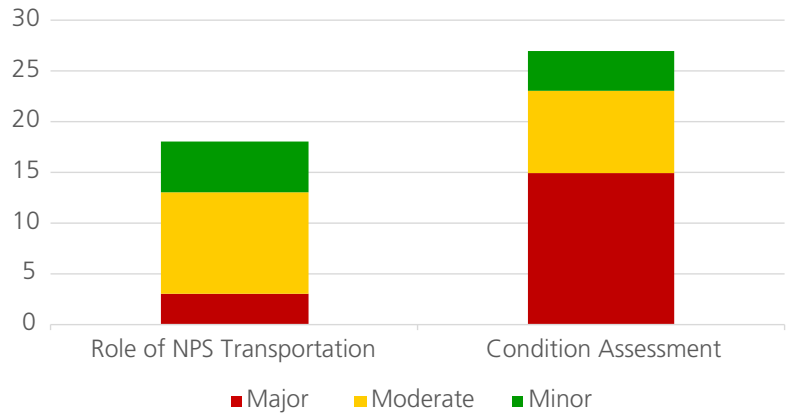
Goal Area: Asset Management

Overall Weighted Ranking of Asset Management Issues

Table 28. Superintendents' Survey Asset Management Responses

	Role of NPS Transportation	Condition Assessment
Major	3	15
Moderate	10	8
Minor	5	4
Total	18	27

Figure 50. Superintendents' Survey Asset Management Responses



Additional Issues Related to Asset Management

- Lack of adequate infrastructure and public information to promote a seamless intermodal network of nonmotorized and public transit travel opportunities (POHE)
- I believe on this cultural landscape there is a conservative approach in maintaining its scenic roadway quality, which I believe is appropriate when challenged with urbanization. But when it comes to the safety of our drivers/users that should overrule the conservative approach as long as it does not have an adverse affect (GWMP)
- Understanding maintenance needs for roads. Life cycle management for assets (ANTI)
- Planning for funding road improvements should to take into consideration associated transportation modes such as the increase in bike/ped use. Funding needs to incorporate not only asset management of roads, but incorporating multi modal transportation improvements as well at the very early planning and funding stages. This way multimodal improvements can be coordinated in a single project. (NAMA)

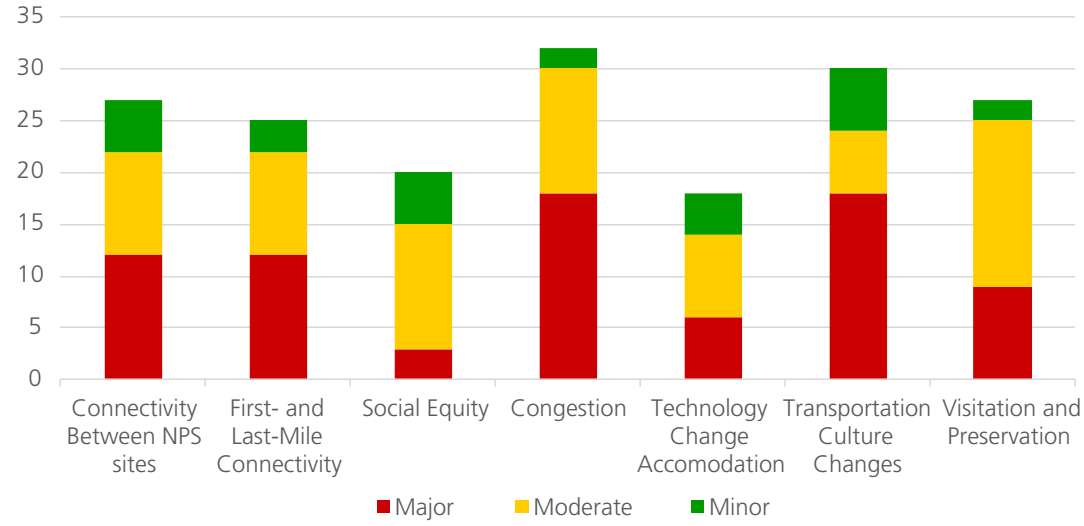
Goal Area: Visitor Experience

Overall Weighted Ranking of Visitor Experience Issues

Table 29. Superintendents' Survey Visitor Experience Responses

	Connectivity between NPS Sites	First- and Last-Mile Connectivity	Social Equity	Congestion	Technology Change Accommodation	Transportation Culture Changes	Visitation and Preservation
Major	12	12	3	18	6	18	9
Moderate	10	10	12	12	8	6	16
Minor	5	3	5	2	4	6	2
Total	27	25	20	32	18	30	27

Figure 51. Superintendents' Survey Visitor Experience Responses



Additional Issues Related to Visitor Experience

- Coordination between and among various public transit agencies (POHE)
- POHE route marking within NPS areas and recognition of POHE segments within NPS print & digital media (POHE)
- While "Major Issues" described here address NPS areas with real and perceived boundaries, NPS needs to think regionally—beyond park boundaries—and consider the ways in which users arrive at particular places and ways in which they move within those areas. (POHE)
- Understanding the differences between the design and intended use of a parkway versus highway. There are fundamental misconceptions that propagate additional false beliefs on what can be done to "improve" the roadway. (BAWA)
- The use of ride-sharing services, such as Lyft and Uber, need to be considered as more of the population uses these services. Factors to consider would be: are they commercial services?; pick-up and drop-off locations; cellular/GPS location services are often needed for locations without physical addresses and that may lack cellular connectivity, especially in the outlying park areas; I am sure there are other issues with these too. (WOTR)
- As an urban area, the National Capital Region has the benefit of regional transit systems. NCR parks should continue to partner with the existing transit systems such as Bikeshare, Circulator and Metro, etc. This would assist the above issues and connect park to park as well regionally. (NAMA)

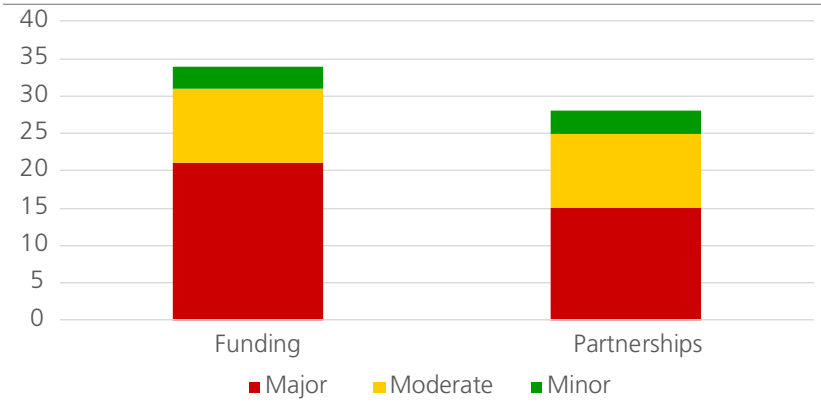
Goal Area: Transportation Finance

Overall Weighted Rankings of Transportation Finance Issues

Table 30. Superintendents' Survey Transportation Finance Responses

	Funding	Partnerships
Major	21	15
Moderate	10	10
Minor	3	3
Total	34	28

Figure 52. Superintendents' Survey Transportation Finance Responses



Additional Issues Related to Transportation Finance

- Continued from Safety: There are speeding issues, blind spot areas and safety "hotspots" that need some traffic calming solutions that our USPP cannot monitor/enforce because of other priority needs and limited staff. (GWMP)
- There is the opportunity to meter the existing free parking and use the revenue for transportation related projects. Parking meters will: manage the public parking turnover allowing more visitors access to park sites; encourage the use of public transit and other transportation alternatives; and use parking revenue to improve and make more affordable visitor transportation related activities inside the park. (NAMA)[1]
- The role of NPS transportation concession operations is difficult in a urban location without gates. For instance, numerous competing sightseeing services stop at NAMA locations (although there is a Big Bus NPS contract); they are not allowed to exchange money on NPS land. The sightseeing buses provide a service for the visitors, but also create additional congestion. One option for NPS to consider may be— DC has instituted a fee from sightseeing operators for each stop within the city. (NAMA)
- Access to Fletcher's Cove (CHOH)

1 Fulfilling the National Mall plan, parking is metered for private vehicles and buses on the National Mall - achieving stated goals to manage parking turnover; make parking more available to visitors; and support use of public and alternate transportation. Revenue from the meters provides NPS share of funding for the low cost, public, 15 stop, National Mall Circulator Route, a partnership transit project with DDOT which allows cash or public transit card use, and stops at two Metrorail stations. Additional NPS revenue will be used for transportation related projects. Increased diverse multi-modal circulation opportunities for visitors include: public transit - Metro and Circulator; variety of bikesharing services and improved bicycling; pedicabs, taxis, and ride sharing; as well as improved pedestrian wayfinding with easy to find and follow maps and graphic guide pylons.

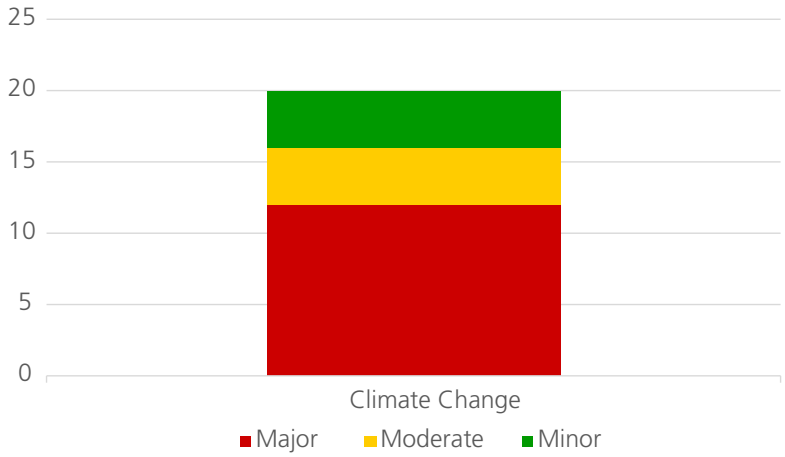
Goal Area: Resource Protection

Overall Weighted Rankings of Resource Protection Issues

Table 31. Superintendents' Survey Climate Change Responses

	Climate Change
Major	12
Moderate	4
Minor	4
Total	**20**

Figure 53. Superintendents' Survey Climate Change Responses

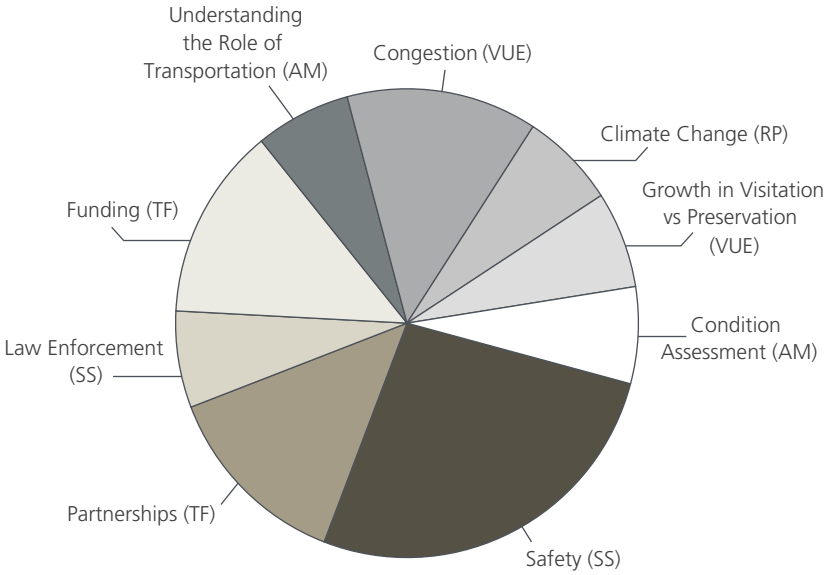


Additional Issues Related to Resource Protection

- The park has been approached on multiple occasions from local community, Senator, non-profits and other interest groups that want to shutdown portions of the southern end of the parkway on weekends for recreational purposes, similar to what happens on Beech Drive at Rock Creek. (GWMP)
- Noise impacts from adjacent roadways that can increase due to development and population growth within the region. Noise from the Dulles Toll Road is legally not to impact performances within the Filene Center, but there are impacts at other times of the day that exceed agreed upon levels; there is also community interest in an extension of sound wall to fill gaps. Extensions could have unintended consequences upon the park and/or community. Sound/noise monitoring should be incorporated into planning of park transportation assets and those of adjacent transportation improvements outside of park boundaries. Exploration of newer technologies to reduce noise impact upon parks, etc. should be advocated for by NPS. (WOTR)
- Hains Point and the Tidal Basin are areas where climate change has impacted transportation assets such as sidewalks, trails, and roads. (NAMA)
- Air quality impacts from idling buses or congestion. (NAMA)
- Cars driving off of the road and damaging resources (hit tree, etc.) (NACE)
- Damage to resources along roadway (soil, grass, native vegetation, etc.) due to vehicles not maintaining their lane. (NACE)
- Stormwater management in roadwork zones. (NACE)
- Mitigation of stormwater impacts due to existing impervious surfaces. (NACE)

First Priority Issue

Figure 54. First-Priority Issue from Superintendents' Survey



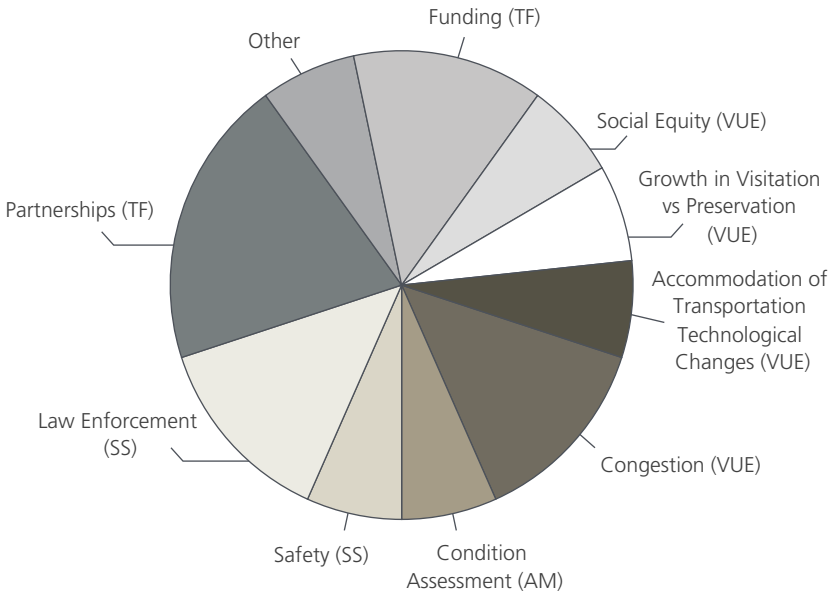
Question: Please tell us a little bit about why this is a major transportation issue for your unit. (If you said "other" above, please provide the issue name.)

- US Route 29 and Virginia Route 234 are two major commuting routes for the Manassas, Virginia, and Washington, D.C. area. Unfortunately, both highways go through and intersect almost in the middle of the park near Stone House. These major highways, busy commuting times, and long lines of traffic make it very difficult for park visitors to see all of the MANA sites and complete the parkwide driving tour to different battlefield locations. (MANA)
- Creating a vibrant, regional network of POHE trailheads, POHE segments and parks accessible to all (POHE)
- I believe it goes without saying, we have failing transportation corridors in the National Capital Region in need of repair that will never receive the full funding that is needed to repair and/or rehabilitate them. (GWMP)
- Safety is the fundamental issue that drives all other subissues. Funding, partnerships, visitor usage, conditions assessments, etc are all focused on how to improve safety. (BAWA)
- Understanding the relationship between FHWY and NPS and the related systems. (ANTI)
- The visitor experience is impacted by the state-owned road constraints for ingress and egress at WOTR. 'Long' wait times are experienced by visitors which can detract from the overall visitor experience. A lack of effective public transportation and connectivity contribute to the problem also. (WOTR)
- The park has a number of roads that serve critical needs for outside parties, including county commuter and bus traffic and the staff of Camp David. The use of park roads by these partners significantly shape the operation and maintenance needs of these roads, yet partners contribute very little to the cost of road maintenance and repair. We have opportunities to bring outside resources to the table to defer much of our maintenance burden, but it will require us to explain why past practices won't continue and ensuring that jurisdictional conflicts or impediments don't exist. (CATO)

- Congestion (along with Changes in Transportation culture) are some priority issues. Congestion impacts (for instance 1200 tour buses daily in peak season) visitor experience and safety. By changing the transportation culture and emphasizing transit and multi modal transit opportunities, this will reduce congestion and result in a better visitor experience and less environmental degradation. (NAMA)
- Changing transportation culture means more variety of multi-modal circulation competing for the same space (congestion) and because tourists may be in an unfamiliar location the results can be confusion, different types of congestion, and unsafe behaviors. BikeShare and Segway use is an example - people wanting to try it, but no time to read our compendium, understand the rules of the road, or find a helmet - and as a result they may end up riding within a memorial instead of walking. (NAMA)
- Maryland Route 355 is a major commuter route that runs through the middle of the battlefield with a posted speed of 50mph. It is also a large component of our auto tour route for visitors. These two uses aren't very compatible and pose challenges to visitor and staff safety and the visitor experience. (MONO)
- Many roadways into and outside the park contribute to storm water erosion into the watered section of the canal in Montgomery County. The canal is essentially nonfree flowing at this point because of the alluvial fans of eroded material in the canal prism. In addition to precluding boat use of the canal the stagnant water is more conducive to becoming a mosquito breeding ground and the potential source of insect borne diseases like West Nile and Zika viruses. Desilting the current sediment is likely in the $3 million range and creating effect storm water management strategies might be in an equal cost range. (CHOH)
- Capacity. Visitation to the park has increased significantly to the extent that there are concerns of various impacts starting to occur such resource damage by vehicles as well as air pollution particularly with large school and chartered buses (PRWI)
- HAFE has visitation of about 300k annually, the vast majority of whom get to Lower Town and the primary visitor areas by using our bus system. We have six 45 passenger buses and a fleet of smaller minibuses. All of our bus fleet is aging and will need replacement within the next decade. Estimated replacement cost for each 45-passenger bus is approximately $500,000 per bus. Without this bus system, HAFE would lose significant functionality (second priority issue below) (HAFE)
- The park needs additional funding to ensure that we can maintain and repair our transportation assets. There is simply not enough funding in the region to maintain our roadways according to AASHTO and FHWA standards. For the most part there is no distinction in the public eye between municipal roadways and NPS managed roadways. Therefore, the expectation of users is to have a roadways that is maintained and managed similarly to a state highway. (NACE)
- Competing users (bicyclists, car drivers, commercial vehicles, runners/walkers) and the safety issues inherent in the diversity of users. Also, the safety of park staff and contractors is impacted by park visitors and users who routinely disobey road closures when work is being done. (ROCR)

Second-Priority Issue

Figure 55. Second-Priority Issue from Superintendents' Survey



Question: Please tell us a little bit about why this is a major transportation issue for your unit. (If you said "other" above, please provide the issue name.)

- Same reason as described above. (MANA)
- Understanding where and how to connect with POHE trailheads (POHE)
- We have many competing law enforcement needs along the parkway and roadway safety is one of them. There is just never enough law enforcement to monitor and enforce the traffic issues on our roadways. (GWMP)
- I would also like to add TECHNOLOGY enhancement along our parkway could help our LE community with addressing the needs. We could install traffic cams, traffic monitoring devices, speed cameras, and other newly created systems to help our depleting law enforcement workforce. (GWMP)
- The B-W Parkway is a single roadway that serves as a major transportation corridor for the region. The NPS alone cannot solve the underlying problems without strong partners to address the issues holistically (BAWA)
- While WOTR does not have major transportation routes, competing for the available funding may be impacted. Associated with any transportation (roads or parking) improvements at WOTR is the need to bring stormwater management up to modern requirements and BMPs. This will be an expensive part of any major rehab or improvements. (WOTR)
- The park has some critical needs that would be eligible for FLIP or FLAP funds, including a fairly straightforward bridge replacement project; however, the funds have been tied up in larger, regionally more urgent needs. (CATO)
- NAMA is integrated into the city transportation system. Efforts should be made to continue to utilize the existing regional system and partner with local transportation entities. This can reduce NPS transportation cost as there is less need for NPS-owned assets and related maintenance. Also, solutions to transportation issues are a regional concern, and many times cannot be solved by just NPS or DDOT (ie tour bus congestion). (NAMA)
- While much progress has been made recently reaching out to state and local government transportation agencies (Frederick County Dept of Highways and MD State Highway

Administration), there is still a significant challenge with trying to convey NPS concerns over road engineering, road speed limits, signage, and road maintenance to these agencies. (MONO)

- With the exception of the park in Georgetown, no other area of the park is accessible by public transit. This means that those without cars and those of lower economic means cannot visit the vast majority of the park. Connecting Great Falls and other areas in DC, Montgomery, Frederick and Washington counties in Maryland would improve accessibility to the park. (CHOH)
- I referenced SS but equally need to address funding. Given the increase in visitation and use the park is experiencing an increase in parking violations which is adversely affecting park resources. The inability to staff more LE Rangers to control and prevent resource damage has become increasingly complex. (PRWI)
- HAFE's main attraction is the Lower Town area, a small area of land that sits at the confluence of the Potomac and Shenandoah Rivers. Because of this limiting geography, parking in that location is extremely limited (overall approximately 150 spots exist to for 300,000 visitors per year). Many of those 150 spots are used by commuters who are not visiting the park but rather riding the MARC trains into DC on weekdays (this is done via a long-standing agreement with CSX/MARC/Amtrak to allow their patrons to park in the train station parking lot, owned by NPS). Because of this parking situation, HAFE implemented a highly effective bus transportation network that alleviates almost all of the parking issues, however, the bus transportation network will require significant investment in the future to maintain a fleet of operating buses. (HAFE)
- Roads that were designed as parkways are now used as freeways. There has been a major shift in the way NPS roads in the DC area are used by the public. They are not seen by the public as NPS resources, they are viewed as municipal resources, the lines are very blurred. (NACE)
- Finding ways to incorporate new and emerging technology while preserving our cultural and natural resources. (ROCR)

Appendix D: National Capital Region Asset Types

The National Capital Region (NCR) maintains a diverse inventory of transportation facilities, including roads (paved and unpaved), parking areas (paved and unpaved), road bridges, road tunnels, trails, trail bridges, trail tunnels, buildings, fuel systems, constructed waterways, marina/waterfront systems, transit systems, and railroad systems. With a wide range of asset types, an inventory definition is critical to understanding the operations, maintenance, rehabilitation, and associated financial considerations required to properly operate the transportation network. The sections that follow describe each element in greater detail.

Paved Roads and Parking

The National Park Service (NPS) maintains a network of pavement and bridge assets that are operated and maintained in collaboration with the Federal Highway Administration (FHWA). This network in the National Capital Region includes approximately 265 miles of paved road, of which about 232 miles are classified as primary public roads (functional classes 1, 7, and 2), which are the principal routes for visitors to access and travel through the parks units as well as to access sites of interest within the parks units. The remaining 33 miles are special purpose, restricted, or administrative in nature, with the exception of approximately 5 miles of city streets (functional class 8) located in the George Washington Memorial Parkway network, Harpers Ferry National Historical Park, and National Capital Parks – East. The National Capital Region also has approximately 11.3 million square feet (equivalent to about 260 acres) of paved parking areas. Applying an average parking density of 100 passenger vehicles per acre, this is equivalent to approximately 260,000 parking spaces. These paved assets have a total current replacement value (CRV) of approximately $1.74 billion.

Road Bridges and Tunnels

The NCR transportation system also is comprised of 155 major road bridges and six road tunnels, which are operated and maintained in collaboration with Federal Highway Administration. These assets have a combined CRV of approximately $963.7 million. Condition data (BHI) is available for 116 bridges and tunnels.

Unpaved Assets

The National Capital Region maintains an inventory of 85 miles of unpaved roads, which provide access to more remote units in the NCR park system, and 1.3 million square feet (about 30 acres) of unpaved parking areas. At an assumed 100 vehicles per acre of parking, this represents about 3,000 parking spaces. These assets have a total CRV of approximately $125.4 million.

Buildings

Many buildings across the National Capital Region provide support functions to the NCR transportation system. These structures include entrance stations, equipment storage, vehicle shelters, maintenance buildings, salt barns, and, in some instances, tour and concession kiosks. In total, the buildings that primarily serve transportation support functions include 33 buildings with 106,000 square feet of floor space, and a combined CRV of approximately $32 million.

Trails

The National Capital Region maintains trail assets that provide visitor access to key points of interest. The National Capital Region considers all trails, including backcountry and frontcountry trails, to be part of their multimodal transportation network. The National Park Service also categorize its trails in a way that considers user preferences, setting, protection of sensitive resources, and other management activities. The National Trail Management Classes are summarized below:

- Trail Class 1: Minimal/Undeveloped Trail
- Trail Class 2: Simple/Minor Development Trail
- Trail Class 3: Developed/Improved Trail
- Trail Class 4: Highly Developed Trail
- Trail Class 5: Fully Developed Trail

The NCR park system maintains approximately 293 miles of trails, 152 trail bridges, and two trail tunnels. These assets have a total CRV of approximately $1 billion, with trails accounting for $797.4 million.

Inside the Beltway

The National Capital Region currently maintains approximately 88 miles of trails inside the Capital Beltway—roughly 30% of the NCR trail network. These trails, the majority of which are located within Rock Creek Park, account for a total CRV of $121.7 million.

In August 2016, the National Capital Region commissioned a study to better understand the trail network located inside the Capital Beltway. The Paved Trails Study[2] not only helped identify gaps in the NCR trail network, but also led to some key outcomes, including the development of a vision for the trail network, a set of achievable goals, and a framework for prioritizing regional funding for trail-related projects.

Outside the Beltway

Approximately 205 miles of trails, a majority of the NCR trail network, lies outside the Capital Beltway. Approximately 172 miles, roughly 84% of the outside the Capital Beltway trail network, is a part of the Chesapeake & Ohio Canal National Historical Park. The trail assets located outside of the Beltway have a total CRV of $675.7 million.

Other Asset Types

Fuel Systems

In the National Capital Region, fuel systems play an important role in fueling fleet vehicles as well as operations and maintenance equipment such as snow plows and street sweepers. All NCR fuel systems have been included in the transportation asset inventory, which accounts for a total of nine fuel systems, with a combined capacity of approximately 19,000 gallons and a total CRV of $805,528.

2 https://parkplanning.nps.gov/document.cfm?documentID=74623

Marinas, Docks, and Launches

In units of the NCR park system that have river frontage, assets that facilitate water transportation are especially important to visitor access and operations. There are 18 marina/waterfront systems such as docks, ramps, and launches, measuring a total of 5,320 linear feet in the National Capital Region. These assets have a total CRV of $3.6 million.

Constructed Waterways

The Chesapeake & Ohio Canal, which has a total length of 184.5 miles, has a major presence in the National Capital Region. However, the NPS definition of "constructed waterway" dictates that they must be navigable to be considered a transportation asset. By this definition, only about 4.3%, or approximately 8 miles, of the total length of the Chesapeake & Ohio Canal is considered to be a "constructed waterway." This asset has a CRV of $50.7 million.

Railroad Assets

Railroad assets in the National Capital Region include approximately 180,000 feet of track and bridge spans that are part of the Western Maryland Railway in Maryland and West Virginia. This section of the Western Maryland Railway is part of the Chesapeake & Ohio Canal National Historical Park. These assets have a total CRV of $173 million.

Transit Systems

Based on the NPS National Transit Inventory and Performance Report (2015), the National Capital Region operates or partners with three transit systems, including the Harpers Ferry National Historic Park Shuttle, the Open Top Big Bus, and the Wolf Trap Express. Although the National Park Service only owns the vehicle operating at the Harpers Ferry National Historical Park Shuttle, the National Capital Region is a key stakeholder in the operation and maintenance of these services through the use of different agreement types with the service providers (i.e., concession or service contracts). These systems reported more than 1,720,000 passenger boardings in 2015.[3] The National Capital Region also owns capital assets that support transit systems such as bus stops at Harpers Ferry and a bus loop at Mount Vernon.

Non-NPS-Owned Transportation Assets

While difficult to quantify, a significant portion of the transportation facilities that supports visitation to the NCR park system is not owned or maintained by the National Park Service. These facilities include local-, state-, and county-owned roads, bridges, and trails as well as transit systems serving both urban and regional park units. For example, several forms of public transportation are alternative transportation systems that are essential to providing access to several NCR park units located in downtown Washington, DC.

Main Roadway Networks

Major regional roadways not only serve as important commuter links, but also assist in improving the accessibility to the NCR park system. Primary and secondary roadways owned and operated by the District of Columbia Department of Transportation (DDOT), the Virginia Department of Transportation (VDOT), and the Maryland State Highway Administration (MSHA) serve as major connectors and mobility providers throughout the NCR park system. In some cases, especially in Maryland, some of the roadways may be owned and maintained by counties or local municipalities.

3 2014 data did not provide boardings for Harpers Ferry National Historical Park Shuttle, so the data from NPS National Transit Inventory 2013 was used (i.e., 270,222 boardings).

Transit Systems

Although the National Park Service owns or operates a limited number of transit systems, visitors often rely on non-NPS-owned transit systems to access and travel among the NCR park units. These transit systems provided by the National Park Service's regional partner agencies have facilitated the development of an extensive transportation network within the National Capital Region. The National Park service does maintain some infrastructure such as limited bus stops and a bus loop to support these non-NPS transit systems. Approximately 40 NCR park units can be accessed with the assistance of one of the many transit systems, with park units located inside the Capital Beltway having a wider range of accessibility and connectivity options. Transit systems include commuter rail, heavy rail, express bus, local bus, and ferry systems. Other multimodal options present, especially in the more urban areas, include bikeshare systems, private tour buses, taxis, and transportation network companies (TNCs).

Trail Networks

Locally-owned and -maintained trails in the proximity of NCR facilities are often developed in collaboration with the National Park Service in order to improve regional connectivity. Trail planning and development is usually achieved through the use of local jurisdictional master plans and regional local government coordination headed by the Metropolitan Washington Council of Governments (MWCOG). The region also contains a number of other regional trails that are commonly managed by nongovernmental agencies.

Appendix E: Summary of Congestion in the National Capital Region

This appendix supplements discussion in Chapter 6: Visitor Experience.

Current Congestion in the National Capital Region

To measure current traffic conditions in the NCR park units, the Metropolitan Washington Council of Governments (MWCOG) travel demand model (Version 2.3.57a) was used. The travel demand model simulates travel patterns for a typical weekday of a specific year (2015, in this case) for the Washington, DC, metropolitan area. The model is commonly used to assess current and future traffic conditions for planning, air quality, and other purposes. The travel demand model produces many outputs, but the primary focus for this effort is assessing congestion performance for:

- Vehicle miles traveled (VMT)
- Vehicle hours traveled (VHT)
- Total travel delay
- Volume/capacity (V/C) ratio

These metrics are measured at the road segment level, but are aggregated up to the corridor level for parkways. In addition, individual segments around park entrances also are investigated. The metrics are further broken down by time period—the MWCOG model produces outputs for different time periods of the day, including the morning and afternoon "peak" periods, when traffic tends to be heaviest, as well as the total daily values. The morning peak period is from 6:00 AM until 9:00 AM, and the afternoon peak period is from 3:00 PM until 7:00 PM.

Regional Context and Trends

The MWCOG Transportation Planning Board (TPB) Financially Constrained Long Range Transportation Plan (CLRP), approved in October 2015, contains congestion statistics for the MWCOG region as a whole that can provide context for the findings.[4] That report indicates that 10% of all lane miles in the region are congested (defined by TPB as V/C > 1.0) in the morning peak period. These lane miles carry a disproportionately high amount of traffic, and 24% of all vehicle miles traveled (VMT) in the morning peak period is on congested roadways. The most congested roadways are in the core of the region (District of Columbia, Arlington County, VA, and Alexandria, VA), with 29% of VMT in that area on congested roadways. The suburbs close to the core had slightly less congestion with 26% of VMT on congested roadways, and the outer suburbs had only 16%. This congestion will likely worsen over time—33% of all VMT in the region is expected to be on congested roadways in 2040 and the Baltimore-Washington Parkway is identified in the CLRP as a corridor where congestion is likely to increase.

These general trends are applicable across the parkways and many of the roadways owned and maintained by Washington, DC, Maryland, and Virginia that provide access to the traditional park roads. As regional population, employment, and travel demand continues to grow, more pressure will be placed on the parkways to accommodate traffic. The indirect impact to the NCR parks will be further constrained and unreliable access to the park areas, particularly during peak travel periods.

4 Transportation Planning Board (2015). *Financially Constrained Long-Range Transportation Plan. Retrieved October 11, 2016, from* http://old.mwcog.org/clrp/performance/congestion.asp

Vehicle Miles Traveled

VMT measures the total distance traveled by all vehicles along a certain road segment. It is calculated by multiplying the distance of the segment by the number of vehicles that traverse that segment—thus, longer corridors with more vehicles have higher VMT. As expected, the longer and more highly traveled corridors of the Baltimore-Washington Parkway and the George Washington Memorial Parkway experience higher VMT than the Suitland Parkway and Rock Creek and Potomac Parkway. Also worth noting, during the peak periods (AM and PM), 37% of daily VMT occurs on the Baltimore-Washington Parkway, 49% on the George Washington Memorial Parkway, and 60% on both the Suitland and Rock Creek and Potomac Parkways. Most peak period trips are commute related, so these high percentages show the extent to which these corridors are used as commuting routes. Also, each corridor experiences more traffic in the afternoon than the morning.

Table 32. Total VMT by Parkway

Parkway	AM VMT (Miles)	PM VMT (Miles)	Total VMT (Miles)
Baltimore-Washington	329,800	476,100	2,164,000
George Washington	241,500	403,900	1,324,000
Suitland	33,500	47,300	134,000
Rock Creek/Potomac	8,470	11,900	34,000

Vehicle Hours Traveled

VHT measures the total time vehicles spend traversing a segment with traffic present. It is calculated by multiplying the time it takes a vehicle to traverse the segment by the number of vehicles. This metric is affected by volume and corridor length similarly to VMT, but takes speed into account. The Baltimore-Washington Parkway shows a proportionally higher VHT than VMT compared to the George Washington Memorial Parkway, this indicates that travel on the Baltimore-Washington Parkway is on average more congested. Also, the morning and afternoon peak period VHT make up a larger amount (about 64%) of the total average daily VHT than the morning and afternoon peak period VMT (about 37%) of the total average daily VMT, which points to slower speeds during the peak periods compared to the rest of the day.

Table 33. Total VHT by Parkway

Parkway	AM VHT (Hours)	PM VHT (Hours)	Total VHT (Hours)
Baltimore-Washington	22,900	32,400	87,000
George Washington	6,800	10,800	29,600
Suitland	800	1,000	2,900
Rock Creek/Potomac	500	600	1,500

Delay

Delay is the difference between the time it takes for vehicles to traverse a segment with traffic present and the time it would take a vehicle to traverse a segment in free-flow conditions; this is multiplied by the number of vehicles traversing the segment to get the total delay of the corridor. Again, the Baltimore-Washington Parkway experiences much more delay than the other parkways, and a higher proportion of that delay is in the peak periods—which again indicates that the morning and afternoon peak periods have much slower travel times than the rest of the day. The Suitland Parkway experiences very little delay, especially outside of peak periods, showing that travel is essentially at free-flow speeds during these periods. The Rock Creek and Potomac and George Washington Memorial Parkways have relatively more delay than the Suitland Parkway, but are not as congested as the Baltimore-Washington Parkway.

Table 34. Total Delay by Parkway

Parkway	AM Delay (Hours)	PM Delay (Hours)	Total Delay (Hours)
Baltimore-Washington	17,300	24,400	51,000
George Washington	2,700	4,000	7,100
Suitland	130	100	250
Rock Creek/Potomac	250	250	520

Volume/Capacity Ratio

V/C ratio is the modeled traffic volume of a roadway segment divided by the capacity of the segment. As the ratio approaches (and possibly exceeds) 1.00, the congestion on the roadway "worsens." Once again, the Baltimore-Washington Parkway appears to be much more congested than the other parkways using this metric. Unlike the other metrics, which are totals, the V/C ratio is not affected by the length of the corridor since it is an average value. This is helpful because it confirms what the other metrics have indicated about the relative congestion of each corridor.

Table 35. Average V/C Ratio by Parkway

Parkway	AM V/C	PM V/C
Baltimore-Washington	0.98	1.01
George Washington	0.59	0.68
Suitland	0.43	0.43
Rock Creek/Potomac	0.63	0.64

Figure 56 through Figure 59 show side-by-side comparisons of the V/C ratio of each of the parkways in the morning and afternoon peak periods. The general extent of the NPS-owned roadways is highlighted in light blue. In these maps, red-colored roadway links have a V/C ratio greater than 1.00, yellow are between 0.75 and 1.00, and green are less than 0.75. Segments that appear to have two overlapping colors show that the V/C ratio is different in each direction of that segment, although many segments without overlapping colors also may have V/C ratios in different categories.

Much of the increase in delay between the morning and afternoon peak periods on the Baltimore-Washington Parkway occurs immediately north and south of the Capital Beltway. It also confirms that nearly the entire corridor is congested in both periods.

The George Washington Memorial Parkway south of Alexandria is largely uncongested in both peak periods. The northernmost segments also are relatively uncongested, indicating that most of the delay takes place roughly from Reagan National Airport to the Chain Bridge interchange with VA Route 123.

In both the morning and afternoon peak periods, the Suitland Parkway is relatively uncongested, although the western portion is nearing congestion in the morning peak period.

Although skewed somewhat by corridor length, VMT, VHT, and delay indicate that the Baltimore-Washington Parkway experiences higher congestion than the other parkways studied, likely due to its use as a major, regional commuter route. Also, while the George Washington, Suitland, and Rock Creek and Potomac Parkways experience nearly all of their delay (more than 90% each) during the AM and PM peak travel periods, the Baltimore-Washington Parkway experiences only 82% of its daily delay during the AM and PM peak periods, indicating that the duration of congestion on the parkway is longer than the others, in addition to the severity. The V/C ratio of each parkway confirms what the other metrics hint at, showing that even when corridor length is controlled for, the Baltimore-Washington Parkway is significantly more congested than the others, which are generally operating under their defined capacity, even during peak periods.

Figure 56. Baltimore-Washington Parkway Peak Period V/C Ratio

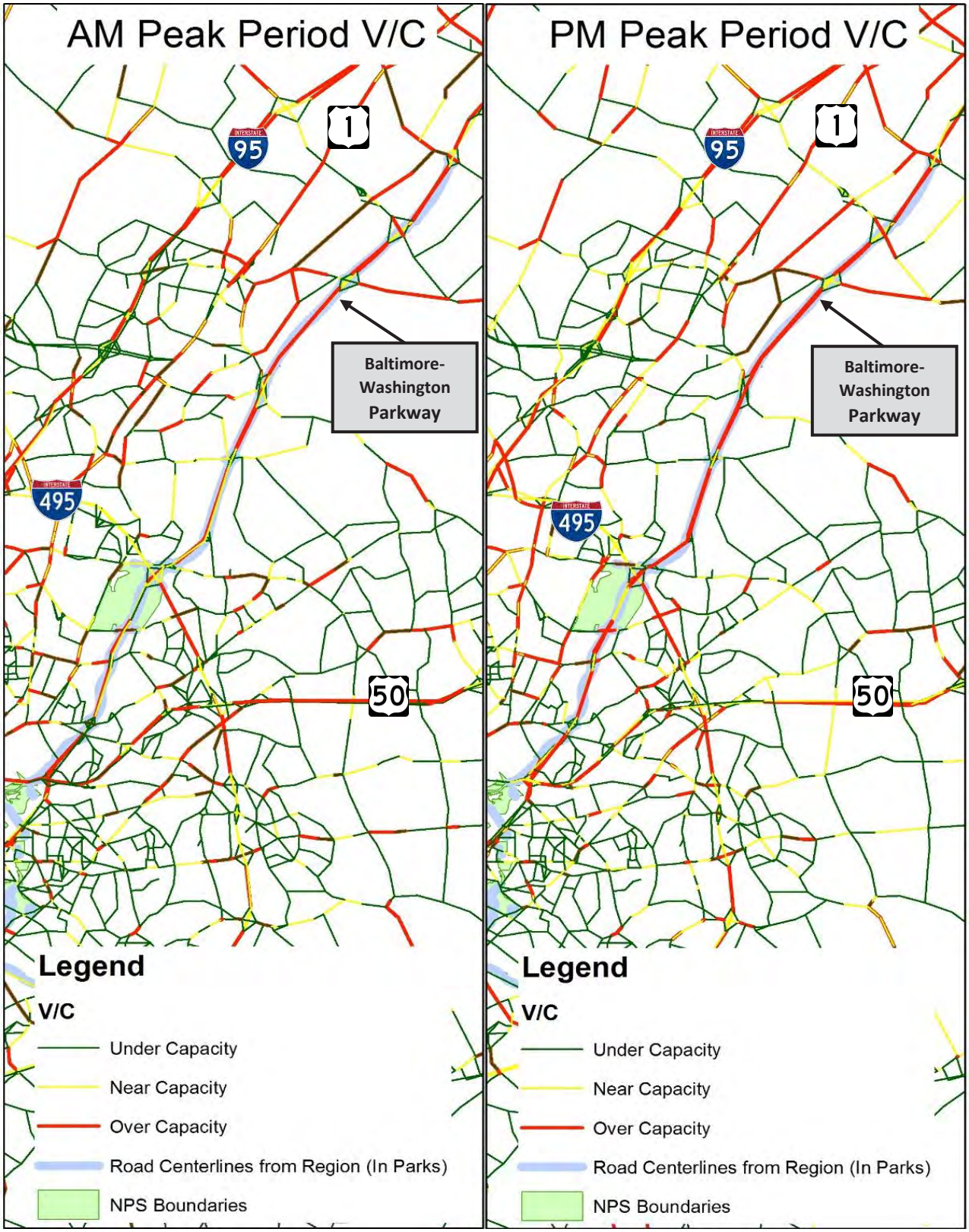


Figure 57. George Washington Memorial Parkway Peak Period V/C Ratio

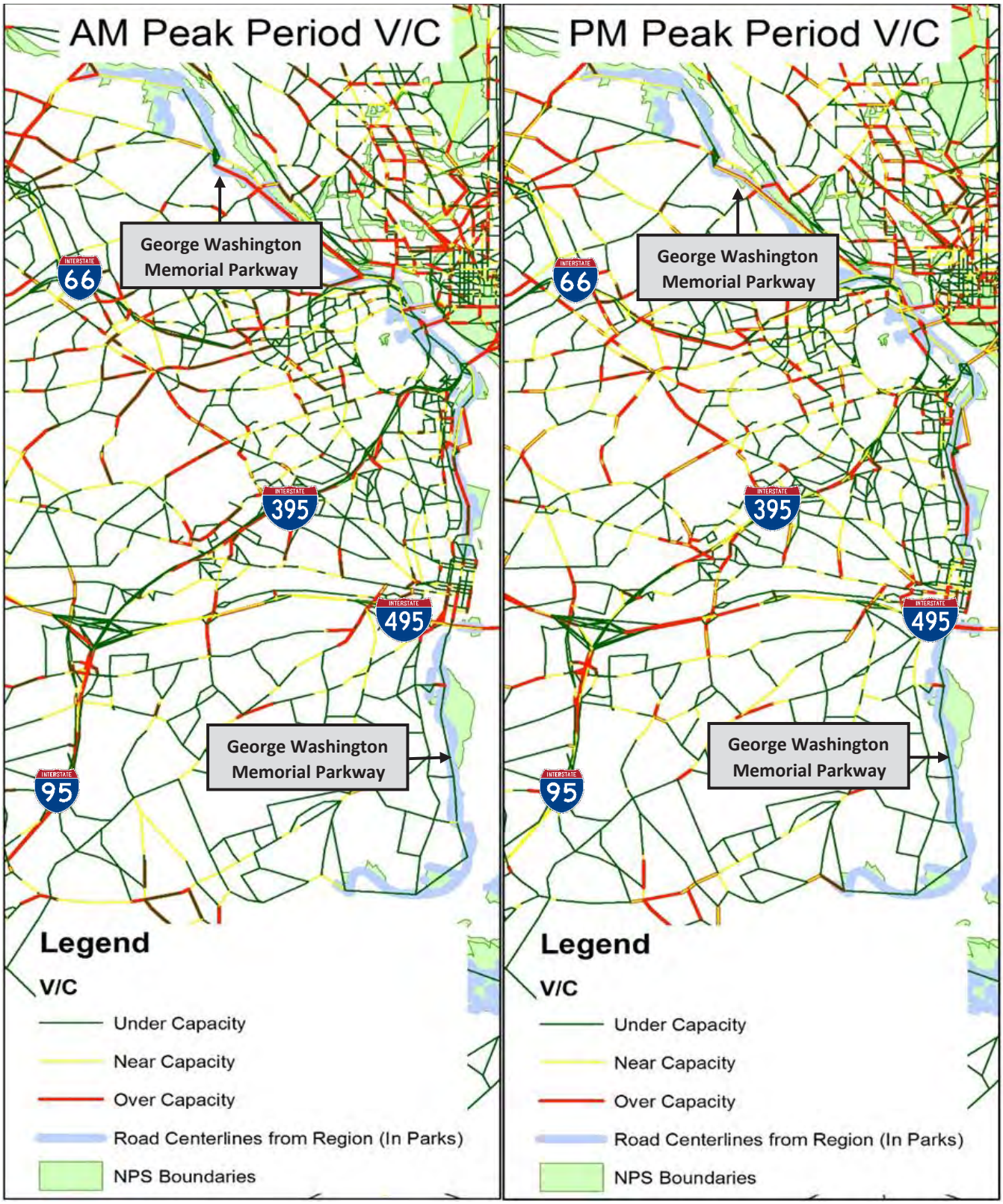


Figure 58. Suitland Parkway Peak Period V/C Ratio

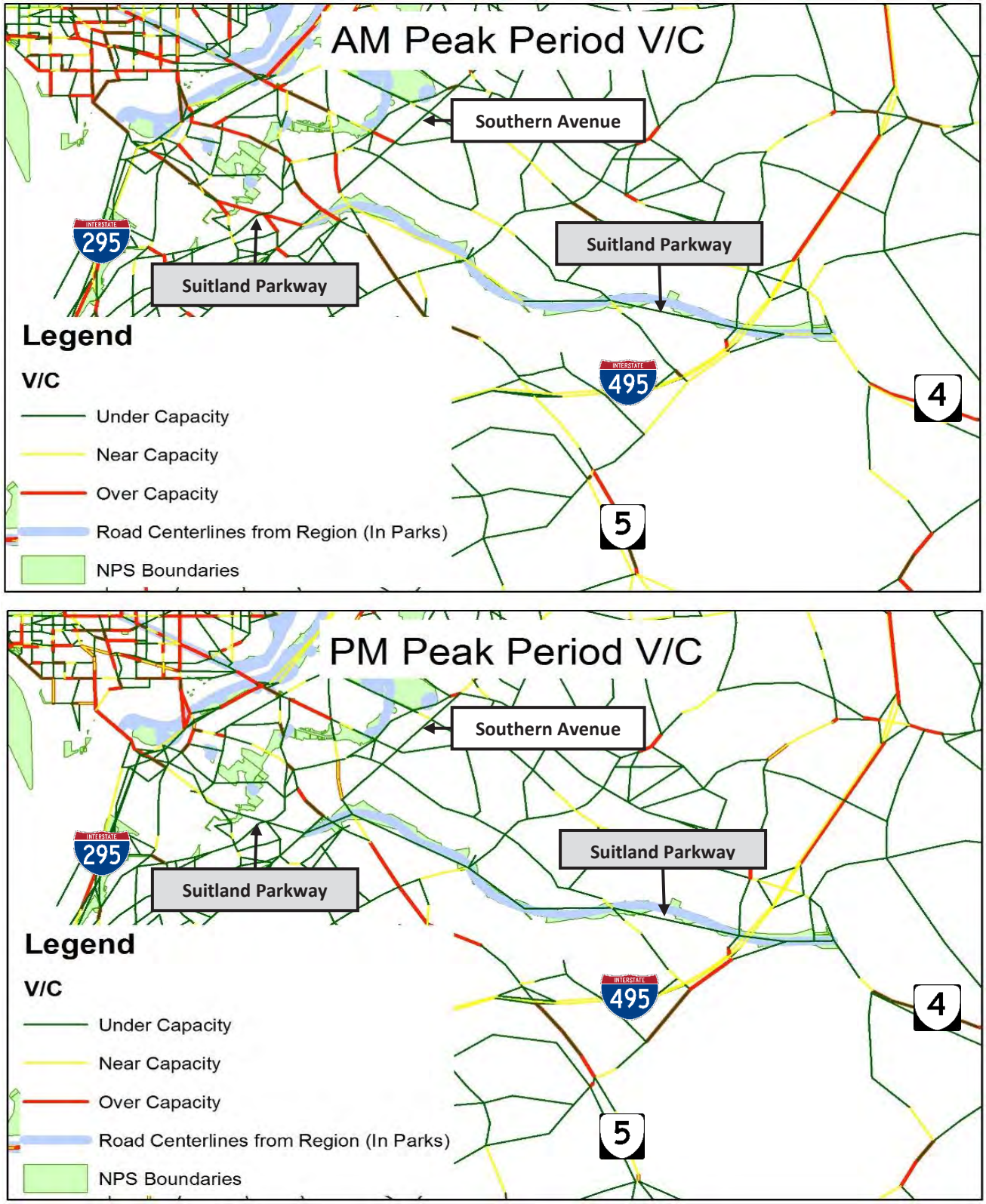


Figure 59. Rock Creek and Potomac Parkway Peak Period V/C Ratio

Traditional Park Roads

In addition to the parkways, congested conditions also were investigated at NCR park entrances and adjacent roadways. The five bridges crossing the Potomac River into Washington, DC, all show indications of major congestion. The Chain Bridge, Francis Scott Key Bridge, Theodore Roosevelt Bridge, Arlington Memorial Bridge, and 14th Street Bridge all have a V/C ratio greater than 1.00 in either the AM or PM peak period. These bridges serve many of the NCR parks and connect directly with George Washington Memorial Parkway, and one—the Arlington Memorial Bridge—is managed by the National Park Service. Many of the bridges across the Anacostia River are similarly congested, including the Pennsylvania Avenue Bridge, I-695 and Martin Luther King Jr. Avenue, and the South Capitol Street Bridge.

Aside from bridges, other areas in and around NCR parks with potential congestion issues (V/C > 1.00) include:

- Independence Avenue near RFK Stadium (primarily during the PM peak for commuters leaving Washington, DC, to access the Anacostia Freeway, Route 295)—access to Anacostia Park and the National Mall
- Independence and Constitution Avenues and north/south streets including 17th, 14th, 12th, 7th, 4th, and 3rd throughout the National Mall (congestion can occur at any time during a weekday, particularly the AM, PM, and midday peaks, as well as on weekends, particularly during peak visitor periods including during the summer, Cherry Blossom Festival, and other special events)—access to the National Mall and Memorials
- New York Avenue (US 50), Eastern Avenue, and the Anacostia Freeway near the southern terminus of the Baltimore-Washington Parkway (specifically during AM and PM peak periods)—access to Kenilworth Park & Aquatic Gardens, and Anacostia Park
- The George Washington Memorial Parkway south of the Capital Beltway through the Belle Haven neighborhood in Fairfax County, VA
- US 29 and Sudley Road entrances to the Manassas National Battlefield Park

Ultimately, congestion around park entrances and on park roads is relatively unlikely to affect park visitation. Most of the congestion in the region occurs during the morning and afternoon commutes, a time when visitors are less likely to go to the parks. The congested river crossings may influence travel from one park to another across the Potomac or Anacostia River, especially during the peak periods.

The MWCOG model does not estimate travel during weekends, so it is not able to determine the effect of weekend congestion on park visitation.

National Park Service

Washington Support Office
Park Facility Management Division
Facilities Planning Branch

For more information please visit the NPS Long Range Transportation Planning website

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